TECHNOLOGY DEPT.

Grinding and Finishing

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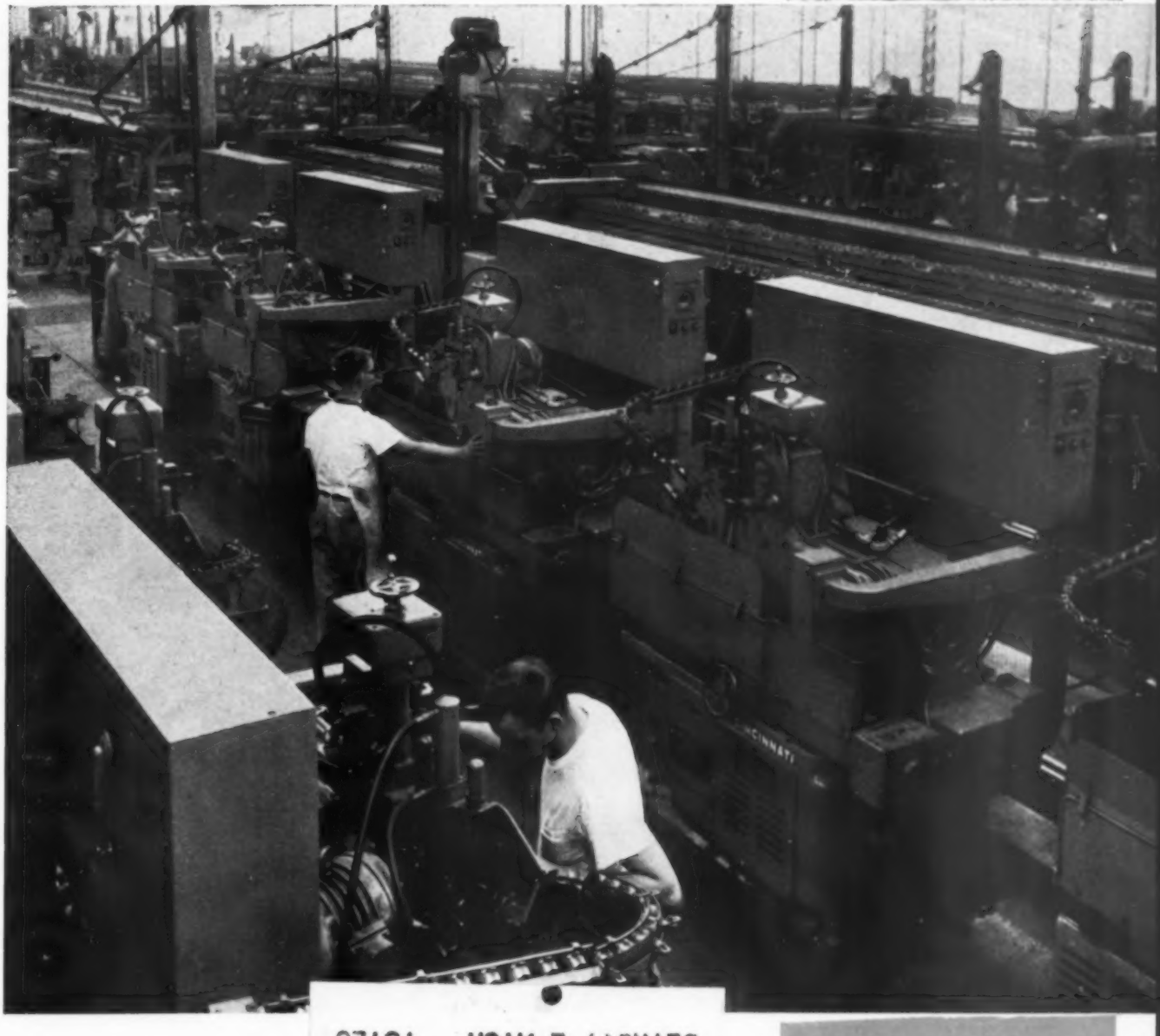
How Hupp Solved Visual Finish and Deburring Problem —page 38



Timken's new automated bearing plant cost $12 million . . . produces 33 million cups and 27 million cones per year

grinding / honing / lapping / polishing / barrel finishing / abrasive cutting / gaging / buffing

a hitchcock publication

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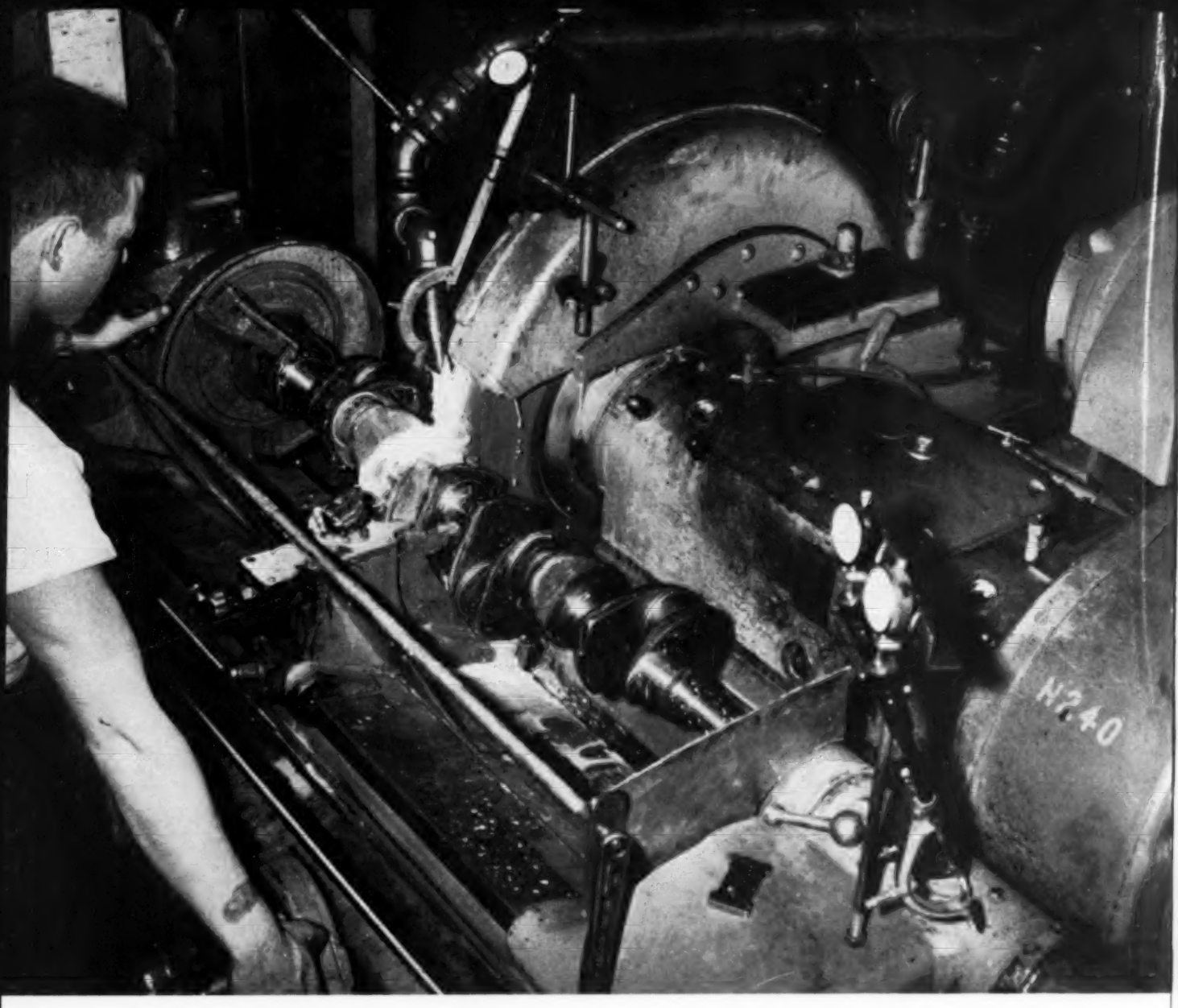

Wheels and work-piece react better with Texaco

The part gets a better finish. There'll be fewer dressings and wheels last longer

Texaco Soluble Oil emulsions keep wheels from loading. Which means there is less frictional heat, parts stay cool, and there's less chance of work distortion.

Texaco Soluble Oil provides excellent rust protection, too. To cite one example (name on request), machined parts of 4150 heat treated steel, left in high humidity for 4½ months, were protected by Texaco Soluble Oil. *Not one rusted.*

Where a clear and transparent oil is desired for thread and form grinding, use Texaco Grindtex Oil. It stays clean because particles settle out rapidly. It comes in three grades: one for standard use, one for non-ferrous metals, and one for hardened steels.

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Contents • Jan. 1958

grinding and finishing

the magazine of abrasive metalworking operations

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BPA

FEATURE ARTICLES

Grinding and Honing in Timken's Automated Bearing Plant 22

Production of 33,000,000 cups and 27,000,000 cones per year requires conveyors, automatic loading, holding, feeding and inspection devices. By Darrell Ward

How Heat Distortion Affects Large Surface Grinders 31

Tests have shown variation of distortion with different types of hydraulic systems. This distortion is critical in machines of 40 inches and up in work length. By John C. Wilson

How Hupp Solved Visual Finish and Deburring Problem 38

Aircraft engine industry requirements for all surfaces to be finished to the same luster are fulfilled at Hupp. By Darrell Ward

Replacement of Old Machine Increases Production of Tamper Bars 41

Accuracy demands, increased abrasive contact and 26% faster overall grinding prompt replacement of old machine.

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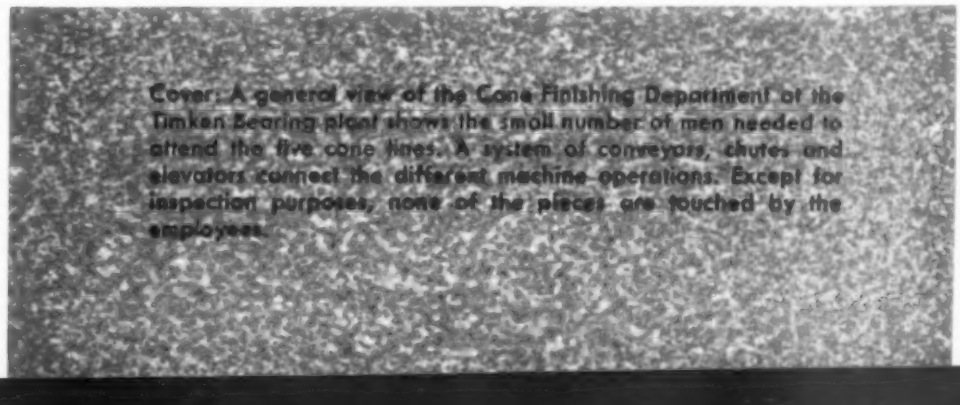
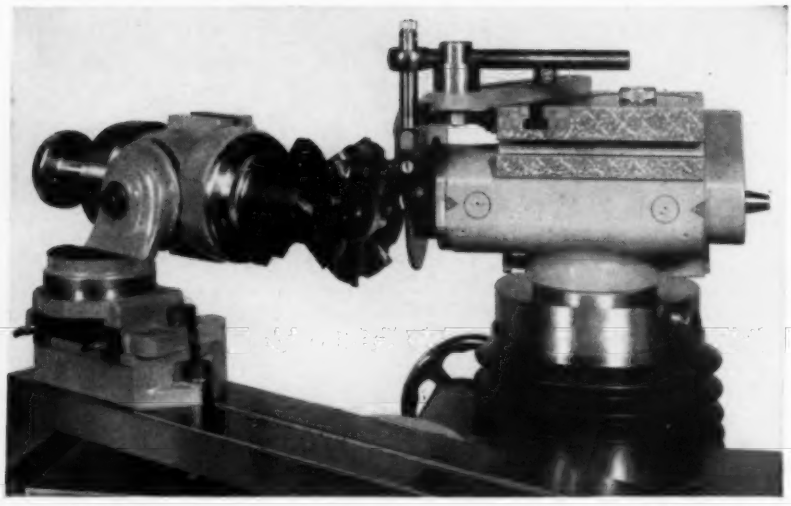


Cover: A general view of the Cone Finishing Department of the Timken Bearing plant shows the small number of men needed to attend the five cone lines. A system of conveyors, chutes and elevators connect the different machine operations. Except for inspection purposes, none of the pieces are touched by the employees.

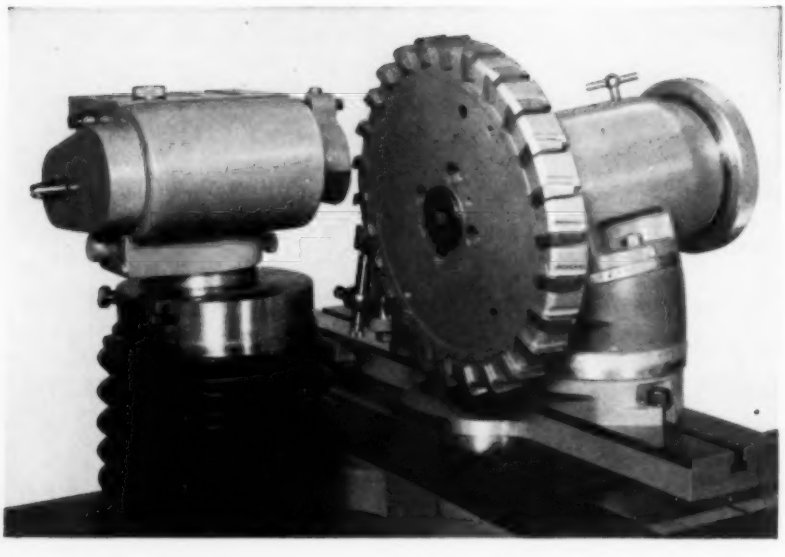
Cincinnat



Angular cutters and large diameter saws are ground with the table disengaged from the conventional taper setting device and swiveled to any angle desired.

CINCINNATI

Taper reamers are a real test of cutter grinder performance. Smooth, anti-friction table traverse and FILMATIC grinding wheel spindle bearings are a big help in grinding reamers for high-quality, free-cutting action.



Heavy face milling cutters up to 18" diameter are mounted on the Face Mill Grinding Attachment for the complete grinding operation: face, diameter and corners.

CINCIN

MILLING MACHINES • BROACHING MACHINES • CUTTER AND TOOL GRINDERS • SPECIAL MACHINOOLS

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accurately grinds just about every cutter in the shop

. . . and quicker than you can read about it! CINCINNATI® No. 2's give you the opportunity to attain two desirable objectives in your cutter maintenance program: 1) Cutters of any size and type, ranging from small end mills no bigger than a pencil to heavy 18" diameter face mills, can easily be ground on these machines. 2) Cutters can be quickly and accurately restored to top cutting trim and a maximum volume-of-chips potential. ¶Check these advantages of CINCINNATI FILMATIC No. 2 Cutter and Tool Grinders against any other equipment within their range:

Anti-friction ball bearing table slide, with hardened and ground ways

FILMATIC grinding wheel spindle bearings have a life span of years

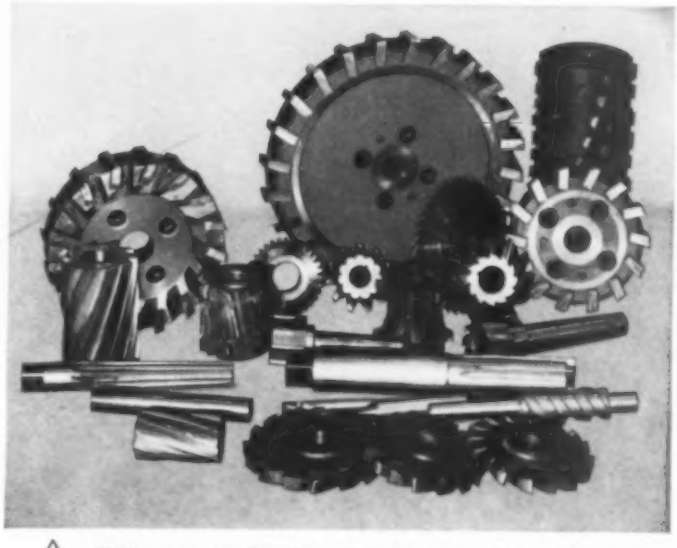
Four operating positions, with both mechanical and electrical controls at the operator's fingertips

Vertically adjustable wheelhead pile, with eccentrically mounted wheelhead to gain extra range

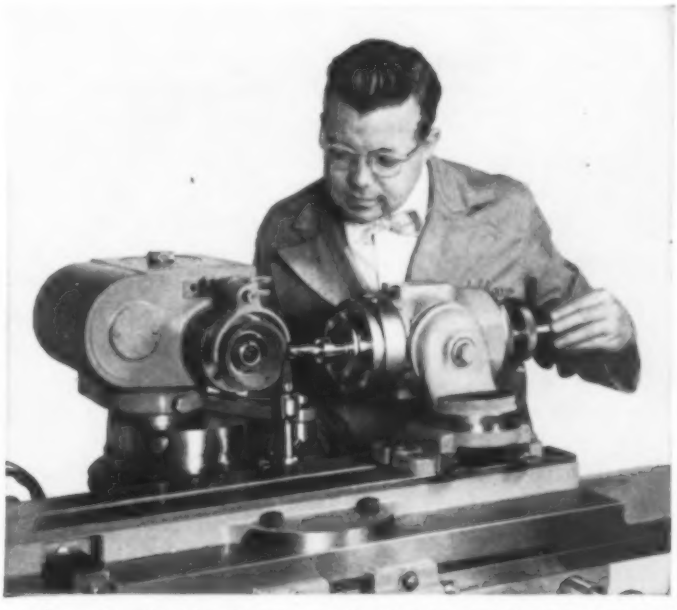
There are many other reasons why you should choose Cincinnati for all your cutter grinding requirements. A few are outlined in Sweet's Machine Tool File. More information in catalog No. M-2004. May we send a copy to you?

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

CINCINNATI FILMATIC
No. 2 Cutter and Tool Grinder
Catalog No. M-2004



Wide range and variety of cutting tools which may be ground on a CINCINNATI FILMATIC No. 2 Cutter and Tool Grinder.



Small end mills are ground with the aid of the Small End Mill Grinding Attachment, usually with the operator seated at one of the two rear operating stations.

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MACHINOOLS • METAL FORMING MACHINES • HARDENING MACHINES • CUTTING FLUID • GRINDING WHEELS

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CUT-OFF WHEELS

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RAILROADS. Track slotting.

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AND . . Cutting off valve stems, cable, mine bits, drill rods, investment castings, etc.

YOU'LL want to cut a caper when you see the sparks fly and learn what these Electro developments can do for your cut-off costs.

Whatever your cut-off operation, these Electro wheels will go far toward eliminating both bottlenecks and production headaches. WHY? These wheels will wade through the biggest, toughest cuts — with fast clean action. You'll have to see it to believe it.

Further, these Electro wheels perform with a minimum of wear.

Two types of wheels are offered; "Cutrite" *(left, Electro patented construction)* and *(right)* the Electro reinforced wheel. To get the most service from these wheels it is suggested that our field representative help you select the right class of wheel for your purpose. Send for descriptive Bulletin GC-7.

K-463

Electro Refractories & Abrasives Corp.
BUFFALO 2, NEW YORK

Letters to the Editor

Barrel Finishing

I would like to have 12 reprints of the article appearing in your October issue, "How Ford Aircraft Saves Money on Deburring Operations by Using Barrel Finishing."

If you can send me these extra copies of the material, I will appreciate it.

H. J. Miller,
General Manager
Speed-D-Burr Corporation

TEAR SHEETS SENT.

Deburring

We have a problem of deburring and we should be glad to have your assistance and guidance in the matter. We make turned and ground shafts, 1⅛" to 8 in. diameter. After the bars are finished they have to be cut up in various lengths. This is done by what is known as a parting machine. It is sort of a hollow spindle lathe, two tools feed in and cut the bar apart. There is always a slight burr. We'd be glad to have any data that you can give us on removing the burr. Can you refer us to any technical papers or engineering articles where this matter is discussed.

W. Wallace McKaig
Cumberland Steel Co.

ARTICLE SENT AS WELL AS NAMES OF MANUFACTURERS OF ABRASIVE BLASTING, LIQUID BLASTING AND BARREL FINISHING EQUIPMENT.

Billet Grinding

Your article on "Automatic Billet Grinding" by Darrell Ward, Field Editor, commencing on page 28 in the current issue is extremely illuminating. We would appreciate receiving two or, if possible, three sets of tear sheets at your early convenience.

A. E. Hamilton
Vice President
Hamilton Pump Co., Inc.

TEAR SHEETS SENT. THANK YOU.

(PATENT APPLIED FOR)

NEW MANHATTAN SAFETY BACK FLARED CUP

Not simply a new safety "feature" . . . not merely a design "improvement." Here's a *totally new concept* of flared cup wheel design *and* construction . . . developed by Manhattan engineers to give the greatest safety and performance advantages possible for flared cup wheel users. Manhattan's revolutionary SAFETY BACK Flared Cup puts portable wheel *safety* where it counts the most—in *original* strength and breakage resistance!

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- **Improved Mounting Base**
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- **Requires No Adjustment**

Only SAFETY BACK gives you these features—*plus* Manhattan's custom-engineered abrasive bond for *faster* removal of *more* metal on your particular job—at no additional cost! For "More Use per Dollar" in portable grinding operations, you can't get a faster cutting, longer lasting—*safer* wheel than MANHATTAN.

Let a Manhattan abrasive wheel engineer show you the advantages of SAFETY BACK Flared Cups, and other types of Manhattan high speed, heavy duty abrasive wheels. Write for Bulletin 7157.

RM-752R1.

GRINDING WHEEL INSTITUTE MEMBER

WRITE TO THE ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

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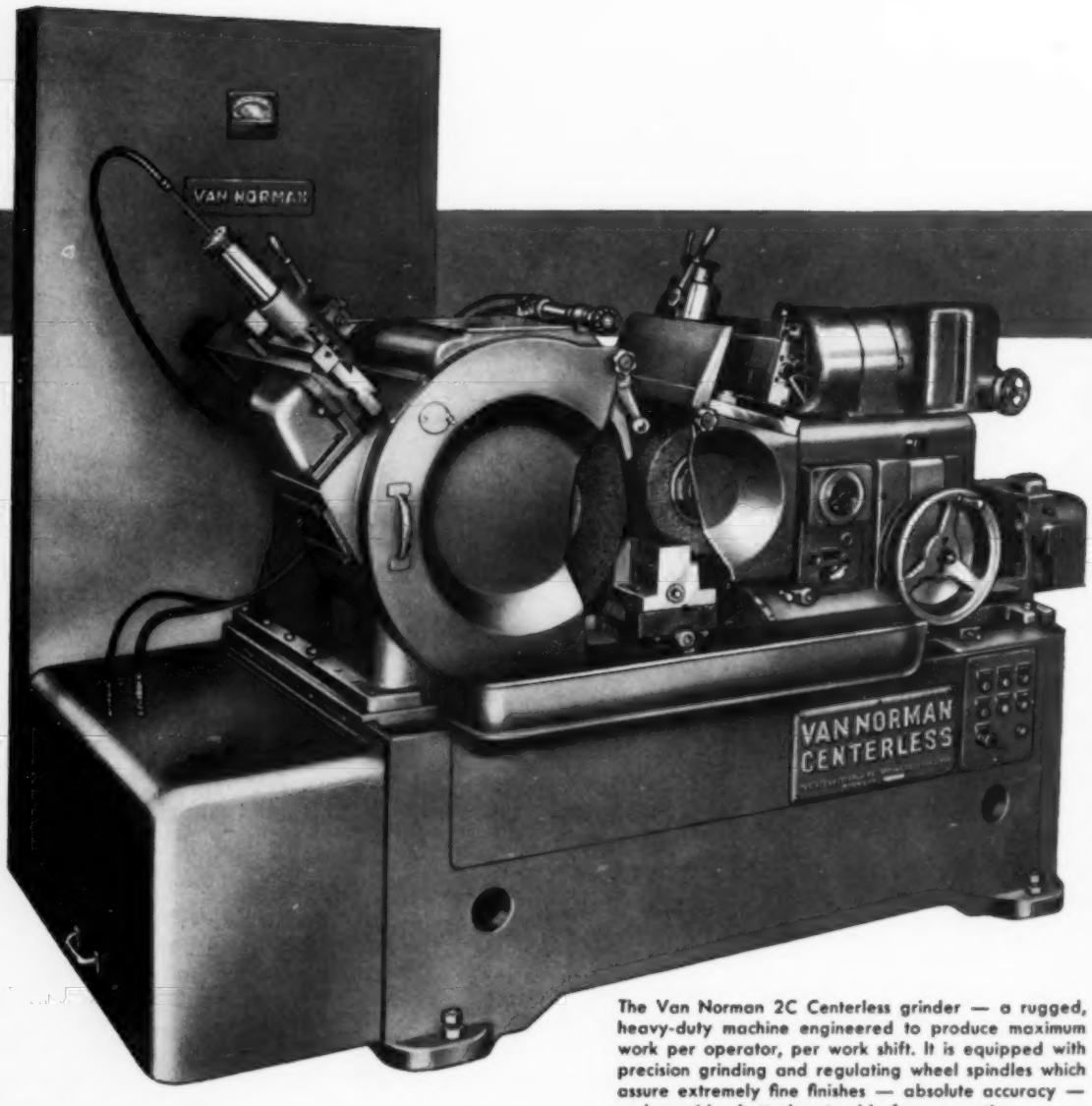
VAN NORMAN

Centerless



The Van Norman 2C Centerless grinder — a rugged, heavy-duty machine engineered to produce maximum work per operator, per work shift. It is equipped with precision grinding and regulating wheel spindles which assure extremely fine finishes — absolute accuracy — and provide chatterless trouble-free operation.

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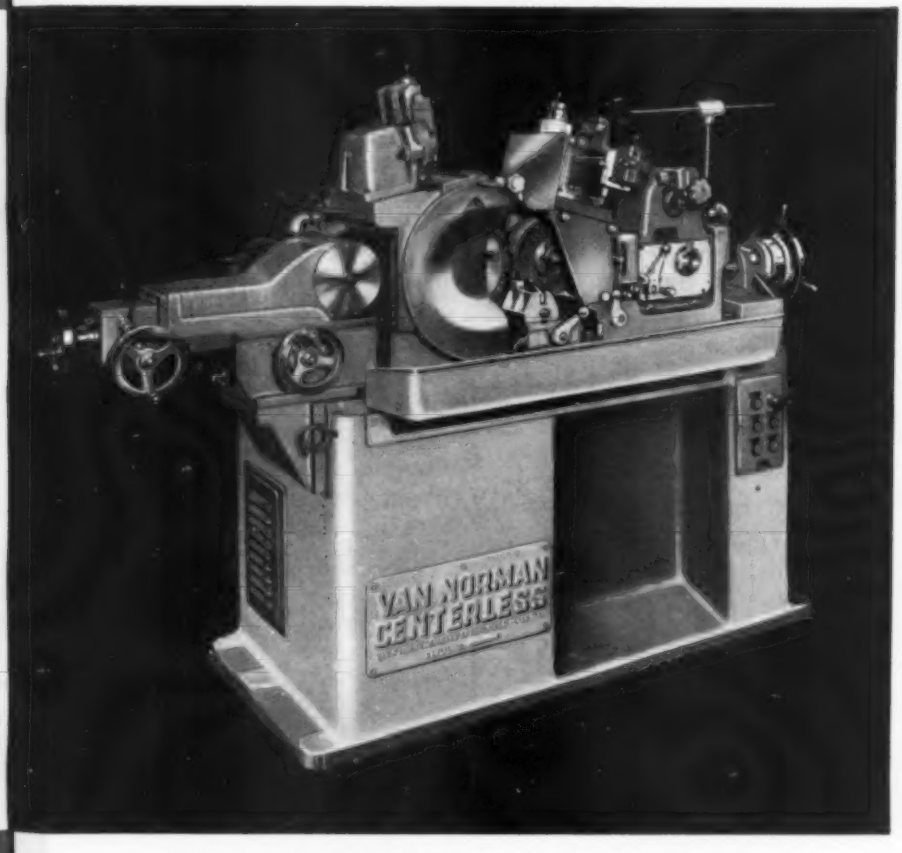
MANUFACTURERS of—Ram and Column Type Milling Machines, Cylindrical Grinders, Spline and Gear Grinders, Oscillating Radius Grinders, Special Production Grinders, Centerless Grinders.

Grinders

Precision Grind Parts Fast, Economically, To Close Tolerances



The Van Norman 1C Centerless grinder — finish grinds some small parts from solid . . . or finish grinds rough-turned parts. The 1C is especially suited for grinding parts used in business and office machines, sewing machines, electrical appliances, aircraft, automobiles, munitions and similar work.

Van Norman Centerless grinders are precision-manufactured to produce a wide variety of parts made of metal, wood, fibre, plastic or glass. Actually these Van Norman Centerless grinders are three machines in one . . . will handle thru-feed work, in-feed work and — equipped with a Crush Dressing Attachment — form grinding and profile work. Get complete details on the Van Norman 1C and 2C Centerless grinders. Write, wire or telephone for catalog.

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Don't wait . . . for extra profit install a Van Norman machine now! They are available in many purchase plans . . . Outright sale . . . Purchase on conditional sales contract up to five years . . . Pay as you depreciate up to 10 years.

GOOD SHOPKEEPING STARTS WITH WINSOR MACHINE CLEANER

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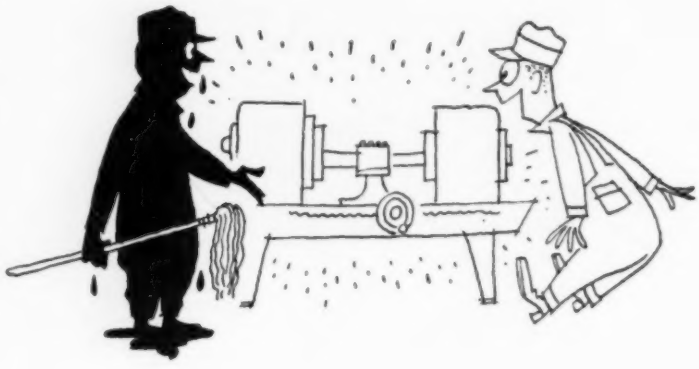

Winsor Machine Cleaner, the first cleaner specifically designed for machine tool coolant sumps, does the following:

- ELIMINATES "MONDAY MORNING ODOR"
- KILLS BACTERIA
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- INCREASES PRODUCTION

GOOD SHOPKEEPING THE WINSOR WAY
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Company.....

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Manufacturers of THE *Lusol* LINE OF COOLANTS, AND WINSOR RUST PREVENTIVES, LUBRICANTS, AND CLEANERS

Letters . . .

Overfinishing

We are very much interested in the article in your GRINDING and FINISHING magazine entitled, "What Price Overfinishing." . . . we would appreciate if you would advise us if reprints of the article are available.

We would like to distribute these among our Foremen, Supervisors, and Standards Personnel and would require approximately twenty copies.

W. J. Reich
Chief Tool Engineer
Worthington Corp.

REPRINTS SENT.

Precision Gage

Thank you very much for the recently published news article on our PG-800 Precision Gage. We thought you might be interested in knowing we've received quite a number of interested inquiries as a direct result of this article.

Sunnen Products Co.
William M. Hissey
Advertising Mgr.

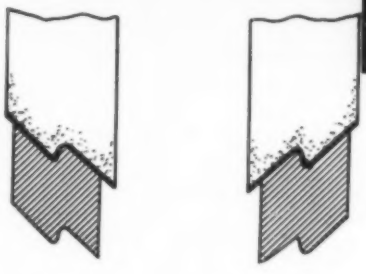
In your September, 1957, issue, pages 67 and 69, you carried an article on Electrolytic grinding, the installation being at Cooperative Carbide Grinding Co. We would like to have 20 to 25 reprints of this article if possible.

W. C. Oatis
Oatis Machinery Company
Toledo, Ohio

"I said, 'It covers the wheel!' Mr. Steel."

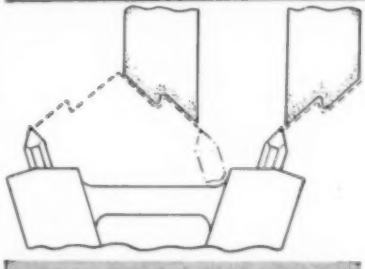
hoglund contour dressing . . .

Four angular jog faces and four radii of this aircraft gas turbine vane are routinely held to tolerances of ±.0002".



enables "tenth tolerance" grinding of turbine vane faces

Two turbine vanes are simultaneously profiled on double wheel grinder. Parts are rotated to grind other side.



One pass automatic dressing employs double diamond fixture. Diamond "A" dresses right wheel; "B" dresses left wheel. Both have uniform peripheral speed.

Precision calculated contour templates are interchangeable. 10:1 inclined plane reduction with ball slides assures repetitive accuracy and trouble-free dressing.

GRINDING PROFILES NEVER BEFORE POSSIBLE . . . are now produced by standard grinding procedures in the aircraft, automotive and business machine fields. Production grinding of parts such as these results from the application of Hoglund Contour Wheel Dressers.

Through automaticity and ingenious inclined planes contour reduction, Hoglund Dressers *initiate the accuracy* necessary to any contour grinding job. Hydraulically operated, tied into the grinding cycle, they feature quick-change contour templates for multiple use.

Hoglund Dressers have been applied to *every type of grinder.* The whole story on their advantages to production or short-run grinding is yours for the asking.

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355 Snyder Avenue • Berkeley Hts., N. J.

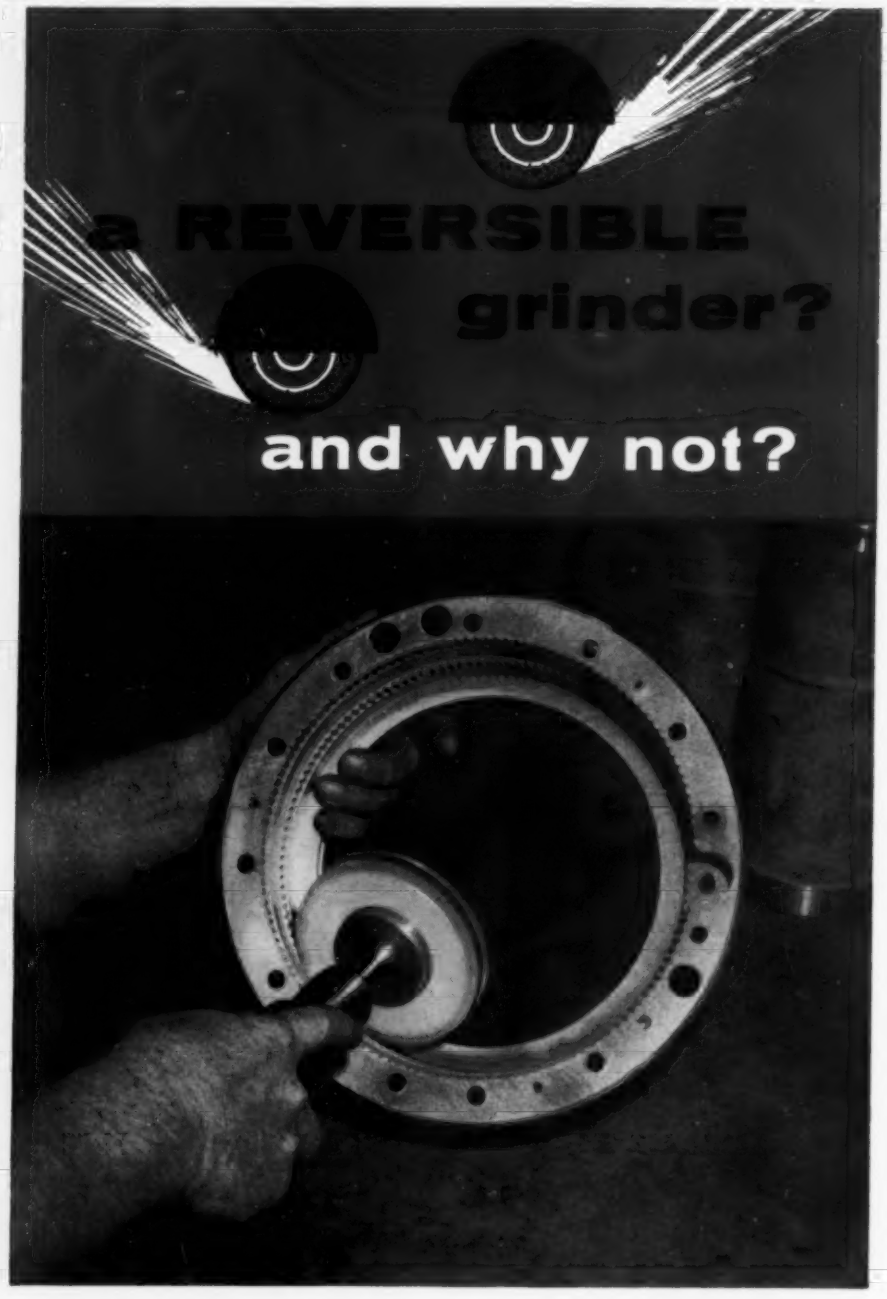
Send for brochure on solutions to tough profiling problems.

Name_____ Title_____

Co. _____

Address_____

City_____ Zone____ State_____



Both edges of the numerous splines in this pitch lock housing must be carefully deburred. The shape of the part prevents working from both ends, so an ordinary single-direction grinder just won't do. So—you simply use a Buckeye *reversible* grinder. Start the job with a grinding wheel, switch to a stainless steel wire brush, then finish up with a tampico brush—and use the same Buckeye tool all the way.

Results? These precision aircraft parts will be subjected to 2500-lb. operating pressures, and must be finished perfectly. And they are, for each part is inspected under a 25-power microscope to make certain not even the tiniest burr has been overlooked, and to see that exact tolerances haven't been disturbed. That's real finishing . . . Buckeye tools finishing!

Why AIR Tools?

Because air is everywhere, just waiting to be put to work . . . because continuous operation can't possibly harm an air tool . . . and because, if you're using Buckeye air tools, you can almost forget about tool maintenance.

For a special air tool for a difficult job, or a standard air tool for routine work, your best buy is Buckeye. Write for our new catalog.

Buckeye Tools
CORPORATION
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Industry Observer

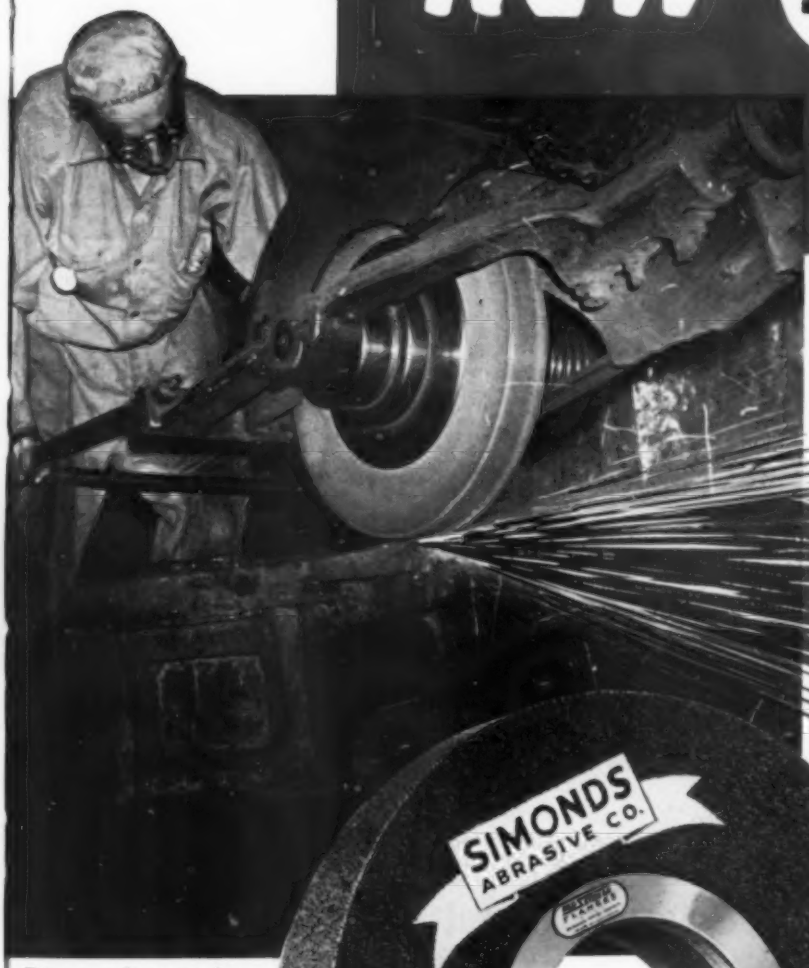
The Strategic Air Command has awarded a contract to prepare plans and specifications for first launching site of the "Snark." Grad, Urbahn and Seelye, announced they have submitted a preliminary planning report of the site for this intercontinental guided missile.

If the United States is Going to Maintain its position of Industrial Leadership in world trade, we must dispel the idea that our smaller businesses need fear our larger ones. In many instances the best customer of Small Business is Big Business. This is the opinion of H. A. Toulmin, Jr., Board Chairman, Commonwealth Engineering Company of Ohio. Mr. Toulmin, stated the United States needs fully integrated manufacturing and research organizations with a diversity of interlocking products, large merchandising and servicing organizations, and men and women capable of visualizing and understanding operations of such magnitude. We must face facts and put into Government and onto committees of the Congress, public servants who recognize that we must have companies big enough and free enough to compete with the business giants overseas.

The National Science Foundation, an independent agency of the Federal Government, has released a report entitled *Graduate Student Enrollment and Support in American Colleges and Universities, 1954.* In this report education outranked every other field of study by a wide margin among graduate students. An estimated 88,500 graduate students of education were enrolled in the Nation's colleges and universities, as compared to 58,000 in the natural sciences and

SIMONDS ABRASIVE CO.

NEW IL BOND Snagging Wheels



MAKING SMOOTH GOING OF ROUGH GRINDING

For rough snagging on swing frame, floor stands and portable grinders.

The life of a hard grade, plus the fast free-cutting of a soft grade! Every Simonds wheel made with new IL Bond has this ideal combination — because of the unique internal lubricating action of this new Bond — another Simonds improvement to bring you the best in grinding wheel performance. Write for Snagging bulletin ESA 62.

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Proven products
Dependable know-how
Quick supply

SIMONDS ABRASIVE COMPANY

Tacony & Project Sts., Philadelphia 37, Pa.

Division of Simonds Saw and Steel Co.

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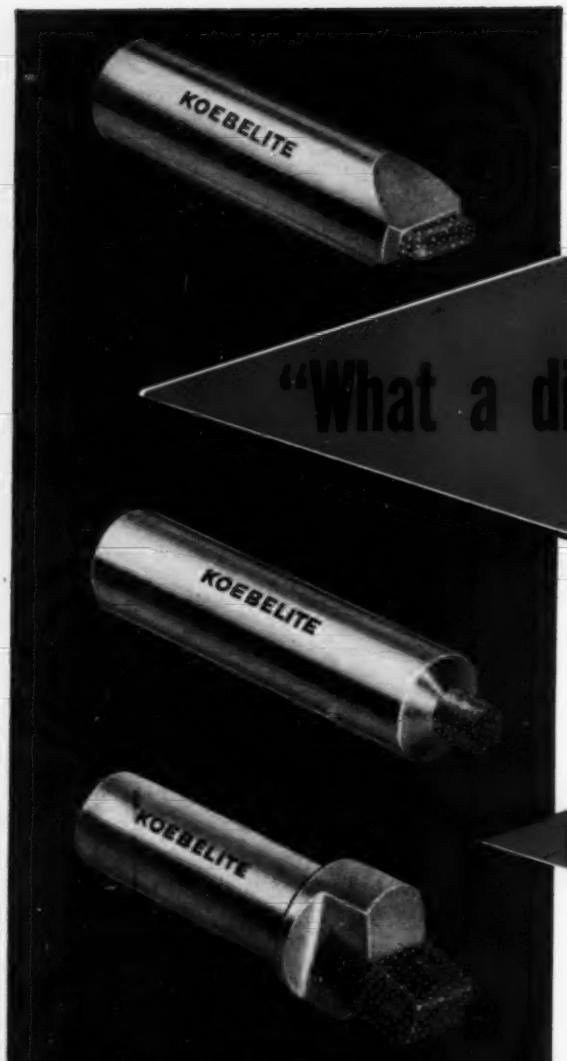
CDP is a registered trade mark of Koebel Diamond Tool Co.



"What a difference CDP* makes"

Over and over we hear this from people after they try (and then standardize on) KOEBEL CDP* dressing tools for grinders.

CDP* tools are different—IN ECONOMY

- you use up every point and piece of every diamond particle.
- there is no wastage. CDP* gives the most efficient use of diamond caratage conceivable.
- you eliminate diamond resetting.
- you get more pieces per dressing.
- longer wheel life cuts wheel costs.
- you cut diamond tool costs (see example).

CDP* tools are different—IN PERFORMANCE

- there's a big difference in results (see typical example).
- they even do jobs big single diamonds can't do efficiently.
- they take the guesswork out of diamond performance by insuring *uniform* results, tool after tool.

Yes, CDP* tools are different

- there is no quality variation in CDP* dressing tools.
- it is their design and manufacturing uniformity that gives you such uniform results.

CDP* Cemented diamond particles—small diamond particles set into a matrix which automatically adjusts itself to diamond wear.

A typical wheel dressing example

	Single Diamond	CDP* Dresser
Life	5 days	60 days
pcs/dressing	12	25
cost/100 pcs.	1.7 cents	0.5 cents

(¼ the tool cost per piece, half the wheel cost, less downtime and double the wheel life.)

CDP* tools take the guesswork out of diamond tools and convert them into WORKHORSES OF INDUSTRY. What carbides did for machining, CDP* tools are now doing for grinding.

Ask for Bulletin #356

KOEBEL DIAMOND TOOL CO.

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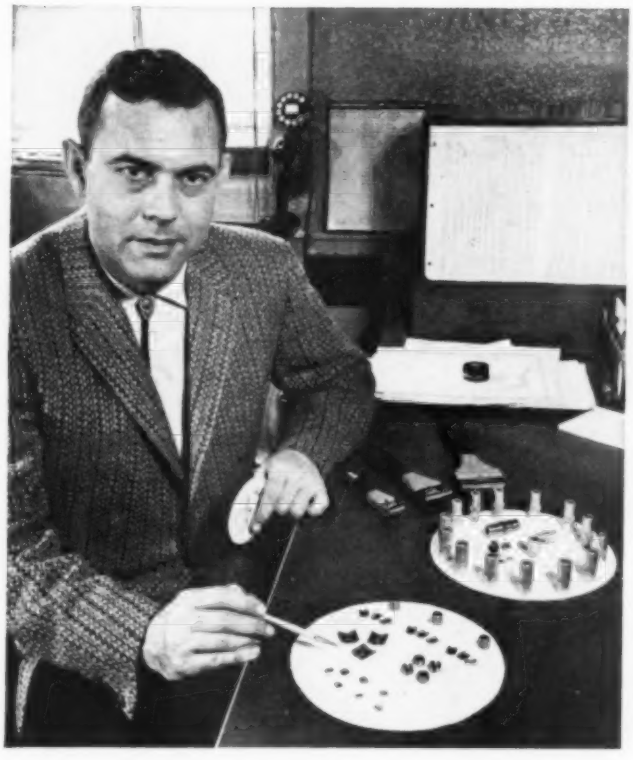
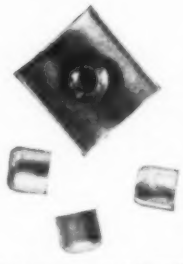
CDP DRESSING TOOLS—SINGLE & MULTIPLE DIAMOND DRESSING TOOLS—CDP CUTTERS

PROGRESS REPORT OF TYPICAL SCREW PRODUCTS CO....



"ALMCO barrel finishing speeds deburring, saves labor costs, stimulates new business!"

Executive of screw products company points to paint scraper nuts and coupler jaws finished with Almco machines and methods.



Paint scraper nut (above)
Grease gun coupler jaws (below)

FAST, EFFICIENT FINISHING ON EVERY JOB! That's the guarantee at one hustling Midwest firm where Almco equipment has replaced hand methods. Now this job shop benefits four ways with this modern finishing method.

Parts are deburred faster and better . . . finishing costs are slashed . . . customers get swift, satisfactory service . . . parts too small for manual methods can now be profitably finished!

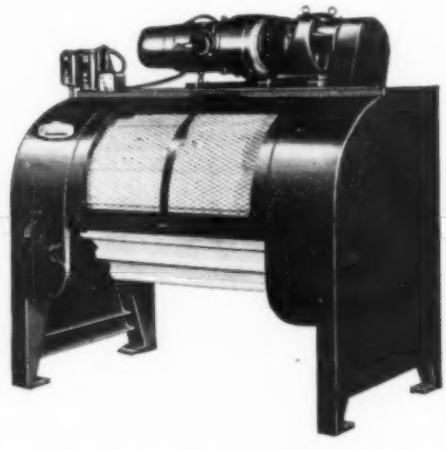
HERE ARE TYPICAL EXAMPLES:

This shop formerly handled only 3600 paint scraper nuts a day by belt sanding, a method that left many burrs. Now 64,000 nuts may be deburred daily with Almco equipment. Savings total 97.3% over former methods, all burrs are smoothly removed.

- Grease gun coupler jaws (¼" x ⅜") could not be finished manually because of small size. Now up to 40,000 are deburred in 10 hours with Almco equipment . . . up to 300,000 jaws are finished each year.
- Heavy burrs on push button switches could not be readily removed without barrel finishing. Now up to 10,000 per hour, 1,200,000 a year can be finished with Almco equipment. Finishing costs total less than $192 per million buttons!

GET FREE SAMPLE PROCESSING

Whether you have a job shop or a plant finishing department, find out what Almco barrel finishing can do for you. Almco's technical staff will examine your product parts, run them through detailed sample processing to determine your specific needs. You'll get a detailed report with recommendations without any obligation. Send in your sample parts with specification requirements.



ALMCO
MODEL DB-400

The DB-400 is a medium capacity machine with a standard barrel size of 30" x 48". This model is very effectively applied to the high production deburring and finishing of stampings, machined parts, smaller forgings and castings. Barrels with 1 to 4 compartments can be furnished.

SEND FOR THIS NEW BARREL FINISHING HANDBOOK

Complete description of the most advanced modern processes. 52 pages of facts, photos, data and cost comparison charts. Write for your personal copy today.

ALMCO

QUEEN PRODUCTS, INC.
131 Marshall Street • Albert Lea, Minnesota
Subsidiary of KING-SEELEY Corporation
Sales Engineering Offices in Chicago, Detroit, Los Angeles, Newark, New Haven, Philadelphia and London, England.
IN ENGLAND: *Almco Division of Great Britain, Ltd., Hitchins, Herts, England*

"The Tool & Die Makers Surface Grinder"

Harig's NEW

TML 6x12 SURFACE GRINDER

THE NEW TML BY HARIG PROVIDES EXTREMELY FAST AND ACCURATE GRINDING—STURDY CONSTRUCTION—ADVANCED DESIGN WITH ECONOMY IN MIND. . . *THE LOW COST WILL PLEASE YOU!*

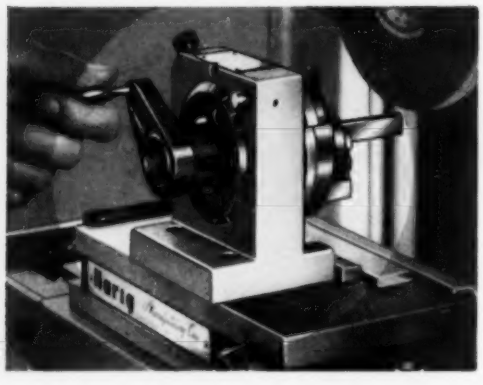
OUTSTANDING FEATURES

- Solid one piece construction of spindle housing and vertical slide.
- Elevating screw centrally mounted.
- Combination "V" and flat ways assure positive alignment.
- Angular rack and pinion mounting distributes wear equally along rack and pinion face.
- Motorized Spindle, dust collector and water unit available.

SPECIFICATIONS

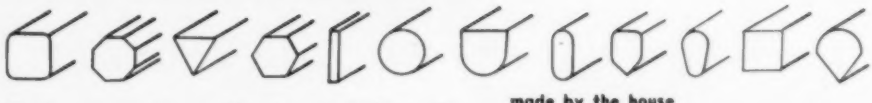
Longitudinal Travel	12-3/8"
Cross Feed Travel	7"
Vertical Working Height (Under 7" dia. wheel)	0" to 12-3/4"
Platen Working Area	6" x 12"
Grinding Wheel	7" x 1/2" x 1-1/4"
Elevator Handwheel Graduation	.0005
Cross Feed Handwheel Graduation	.001

Remember: Harig's Famous Precision is in Evidence Throughout!



Harig's IMPROVED Grind-All FIXTURE

"The Latest Advancement in Perforator Grinding"



Fast, accurate perforator grinding fixture — hand crank for easy rotation of index plate, single locking screw for making quick set-ups. Easily grinds irregular shaped perforators concentric with shank within ±.0002 accuracy. Also can be used as milling, boring and inspection fixture. NEW! RADIUS DRESSER ARM—attachment makes Grind-All Fixture a highly accurate radius dresser.

made by the house that precision built!

Harig Manufacturing Corp

5769 W. Howard St. - Chicago 31, Ill.

Industry Observer . . .

engineering and 68,000 in all other fields. The education students however only received 4% of stipends in the form of assistantships or fellowships. The average yearly stipend ranged from $1,560 in engineering to $920 in education.

To Meet Demand for Highly Trained Scientists and Engineers in nuclear fields, the Atomic Energy Commission has broadened one of its special fellowship programs to include study through the doctorate level.

Fellowships, to be known as the "AEC Special Fellowships in Nuclear Science and Engineering," have been established to provide a total of 150 fellowship grants on a one-year basis to first-, second-, and third-year graduate students. The fellowships carry basic stipends of $1600, $1800 and $2000 respectively, with additional allowances for dependents, tuition and travel. The original program was announced on October 30, 1956, and supported one year of study at the first-year graduate level.

A fellowship board composed of representatives of industry, educational institutions and the Commission will make the final selection of the 1958-59 candidates about March 15, 1958.

Applications are open to graduates in chemistry, engineering, mathematics and physics. Application forms may be obtained from the University Relations Division, Oak Ridge Institute of Nuclear Studies, P.O. Box 117, Oak Ridge, Tennessee.

Nuclear Power Requirements in a speech delivered before the Atomic Industrial Forum—American Nuclear Society in New York city, Mr. Lewis L. Strauss, Chairman U.S. Atomic Energy Commission, discussed the difference in requirements for nuclear power between the United States and Great Britain.

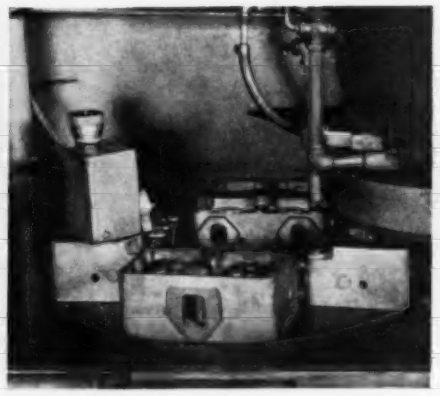
2,400,000 STROKES WITHOUT SERVICE

Aircraft windshield wipers made by Alco Valve Company must function perfectly for at least 100 actual operating hours.

Dia. range of standard honing tools: ⅛" to 2½"
To assure reliability, honing was specified for the bore of this forged aluminum wiper body.
Alco knew from past experience that Sunnen Honing was the most efficient process for this critical job which required a .0001" tolerance and an 8 micro-inch finish.
With Sunnen Honing every bore comes out straight and round . . . despite the large port. There's no problem holding the close tolerance. The part is not fixtured . . . thus every bore can be gaged in minimum time, and exact size guaranteed. Sunnen precision-graded honing stones consistently produce the fine finish required.
No rejects in production . . . no failures in service!
You can handle ultra-precision work like this with an investment of less than $1,000. Ask for a free demonstration.
SEND FOR FIVE INFORMATIVE HONING BOOKLETS
CHECK READER SERVICE CARD
SUNNEN®
PRODUCTS COMPANY
HONING

Whatever your grinding job may be...

200 adjusting screw washers are ground on one side in one hour. Stock removal .025"; limits ± .001".

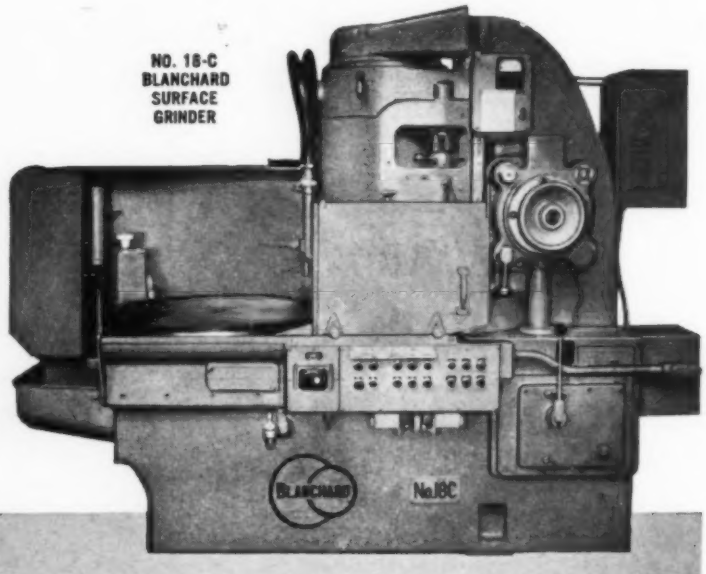


Tops of cylinder heads ground 21 per hour; stock removal 3/16" to 1/4". Bottoms 55 per hour; stock .012"; limits ± .001".

56 cast iron plates are ground on one side in one hour. Stock removal .140"; limits .001".

for best results...

The Blanchard No. 18-C Surface Grinder has the speed and precision that guarantees economical grinding on an endless variety of jobs. After the initial setup, the automatic cycle handles every operation from start to finish. The operator is freed to prepare the next load or to operate a second No. 18-C Grinder.



NO. 18-C BLANCHARD SURFACE GRINDER

Put it on the Blanchard

The 18-C Automatic Cycle...

Moves chuck to grinding position and starts it rotating

Starts wheel rotation and coolant pump

Provides rapid wheel approach to work

Engages power down-feed at preset rate

Changes to fine feed just before finished size is reached

Stops feed when work is to size—"sparks" out. Raises wheelhead

Stops wheel, coolant pump, and chuck

Moves chuck to loading position—demagnetizes chuck

Can be changed quickly to manual operation

Automatically Controls Size!

Send today for your free copy of 18-C folder.

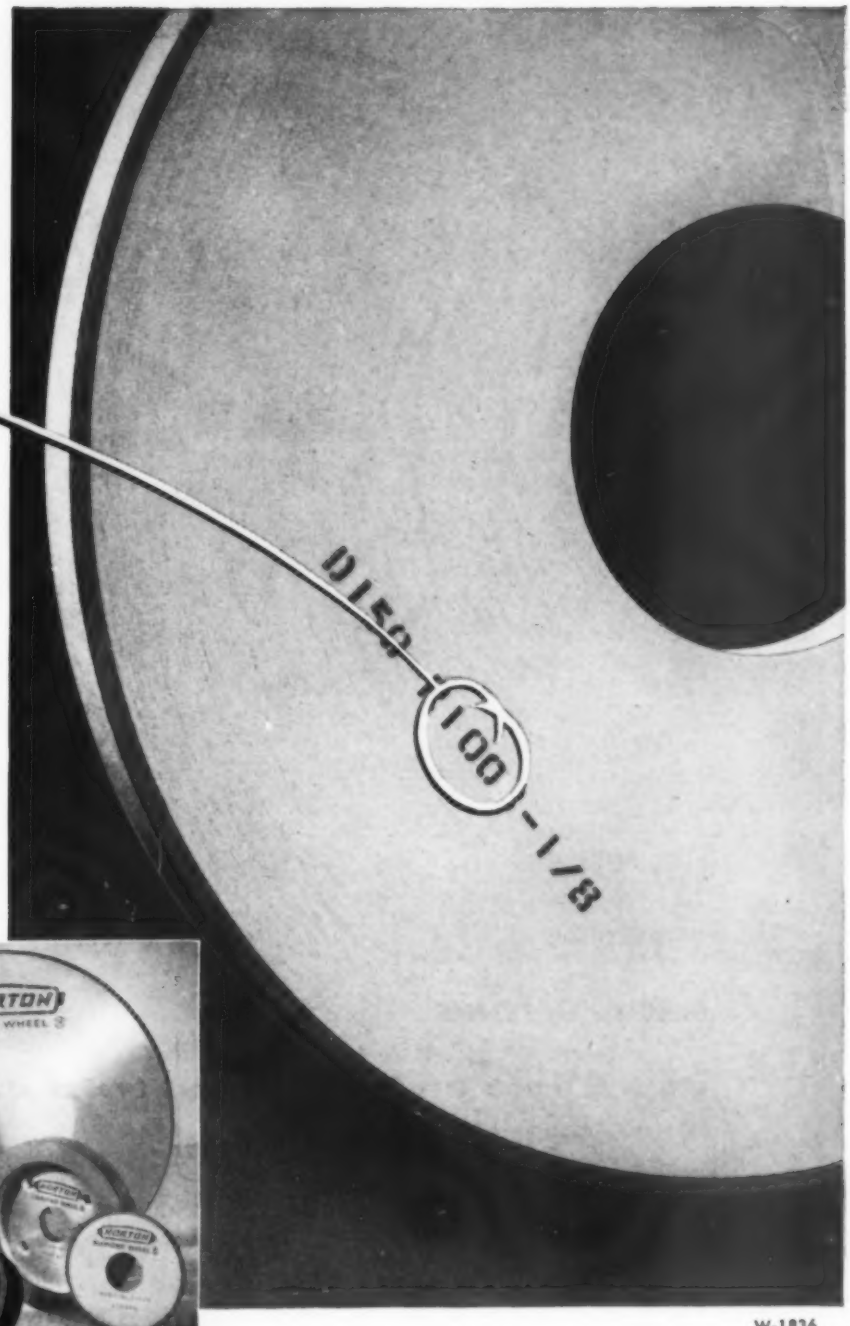
BLANCHARD

THE BLANCHARD MACHINE COMPANY

64 STATE ST., CAMBRIDGE 39, MASS., U. S. A.

On Norton diamond wheels ...this mark is

Your CERTIFIED Buying Guide



W-1836

On this Norton diamond wheel we have highlighted the mark indicating diamond concentration — in this case, 100.

What is the exact meaning of the Norton 100 mark?

It means that each Norton 100 concentration diamond wheel contains an amount of diamond in carats calculated to a formula of 72 carats per cubic inch. Wheels of 75, 50 and 25 concentration of diamond contain 75%, 50% and 25% of this 100 concentration standard, respectively.

The finished wheel contains the calculated number of carats of diamond except for the slight loss resulting from truing the diamond section to place the wheel in proper truth and condition for grinding.

With each wheel you get a certificate assuring the complete dependability of its concentration mark, signed by the President of this Company.

The Norton certified mark is your safest possible buying guide. It assures the top performance and long wheel life that you're paying for.

And remember:

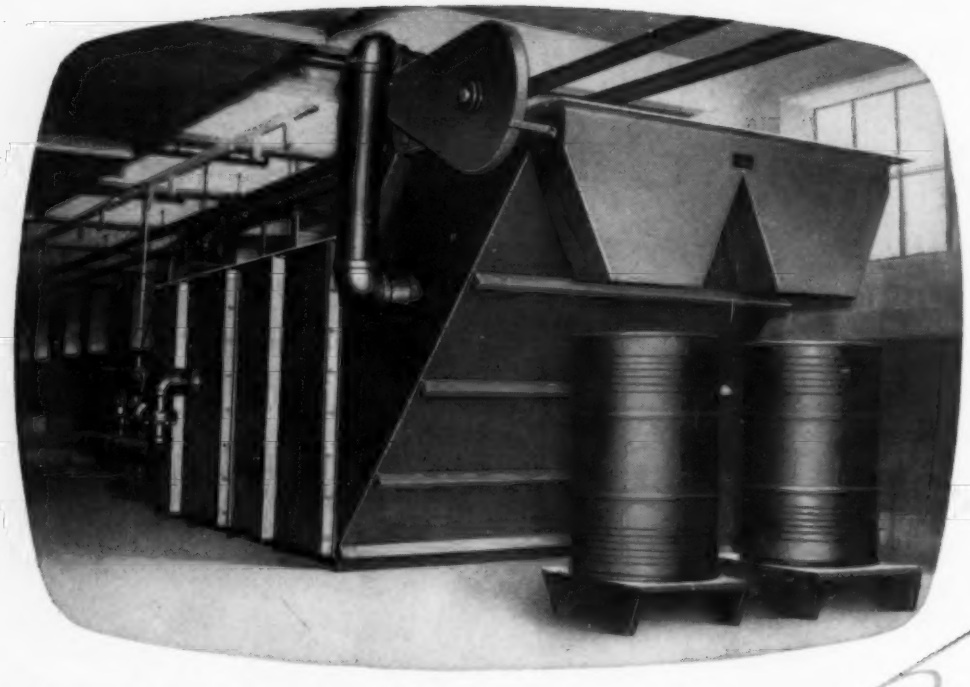
Besides duplicating wheel specifications with constantly controlled accuracy, Norton was first to introduce all three types of diamond wheels — metal, resinoid and vitrified bonded . . . does all its own sizing, grading and laboratory checking of diamond bort . . . brings you a complete line, covering every diamond wheel application . . . gives you fast service from full stocks.

See Your Norton Distributor

for the diamond wheels you need. Or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

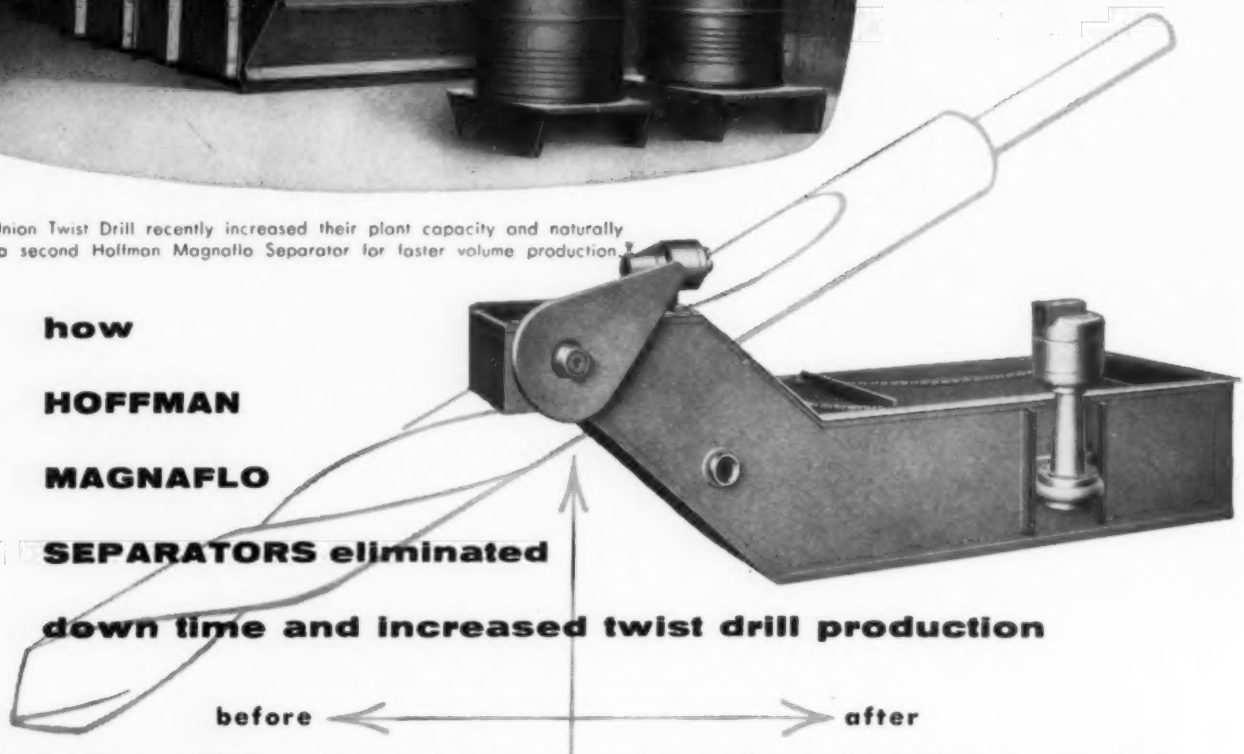
NORTON
ABRASIVES
Making better products . . . to make your products better

NORTON PRODUCTS
Abrasives • Grinding Wheels
Grinding Machines • Refractories
BEHR-MANNING DIVISION
Coated Abrasives • Sharpening Stones
Pressure-Sensitive Tapes



HOFFMAN
INSTALLATIONS
PAY THEIR WAY
AT
UNION TWIST DRILL
COMPANY

Note: Union Twist Drill recently increased their plant capacity and naturally added a second Hoffman Magnaflo Separator for faster volume production.



how HOFFMAN MAGNAFLO SEPARATORS eliminated down time and increased twist drill production

before ← → **after**

the installation of a Hoffman Magnaflo Separator at the Union Twist Drill Co. plant in Athol, Massachusetts, these were some of the problems encountered in the use of cutting oils and coolants:

1—Contaminated oil interfered with production quality, resulting in numerous rejects.

2—Heavy sludge hampered grinding wheels, requiring frequent dressing.

3—Dirty cutting oil was discarded.

4—Maintenance costs were high.

5—Considerable down-time was required for cleaning.

HOFFMAN MAGNAFLO SEPARATORS

a Hoffman Magnaflo Separator for the removal of metal particles from oils and coolants was installed, these time and money saving clarification improvements were noted:

1—Clean oil cut rejects to a minimum.

2—With the need for constant wheel grinding eliminated, wheel-life was extended.

3—Oil could be used over and over again.

4—The Magnaflo Separator required virtually no maintenance.

5—Down time was reduced to a minimum.

custom designed for your needs

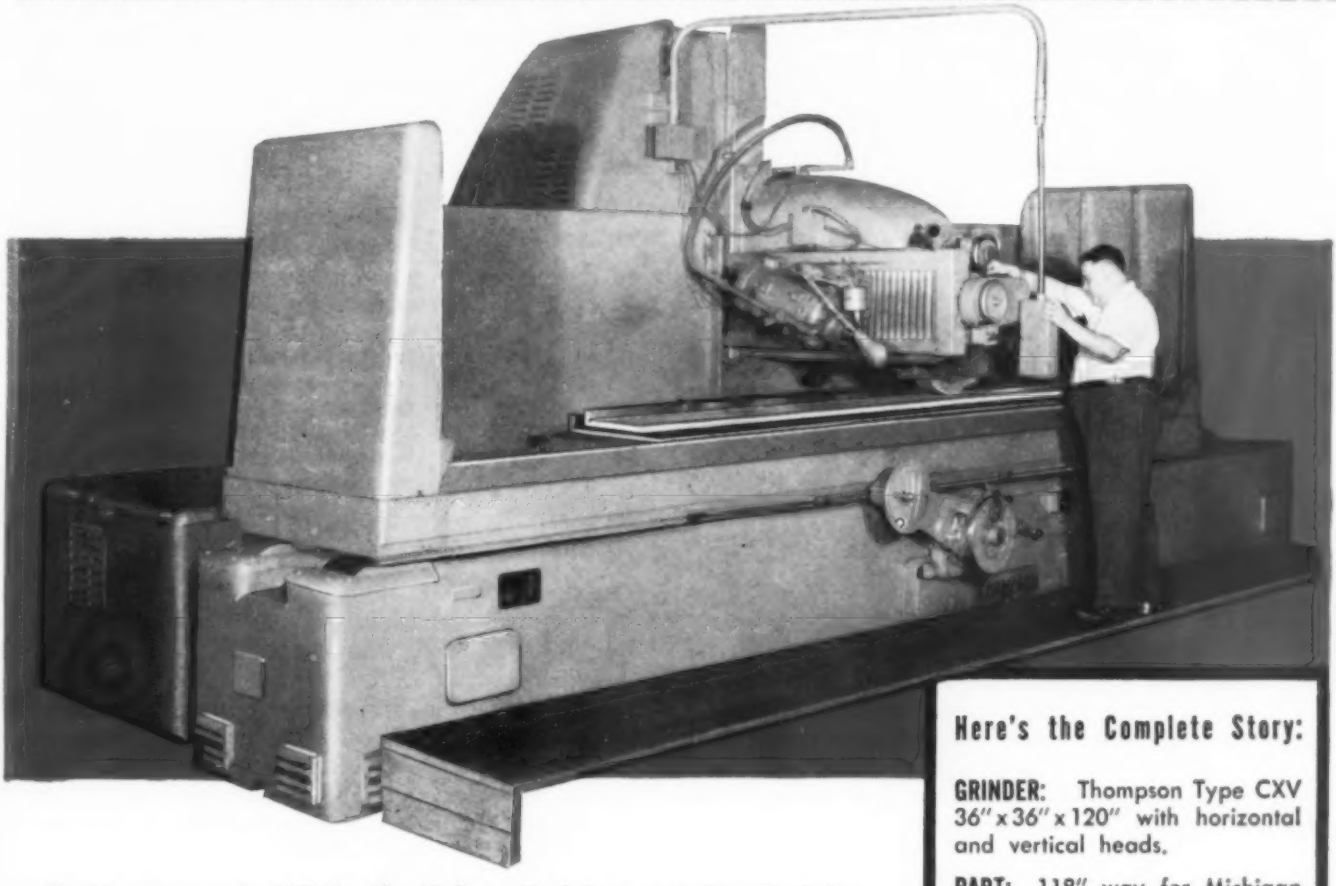
We'll be glad to make a survey of clarification problems in your plant. No obligation, of course. Write for Magnaflo Separator Catalog A-860, which is devoted exclusively to the removal of ferrous material from cutting oils and water soluble coolants.

INDUSTRIAL FILTRATION DIVISION U.S.HOFFMAN MACHINERY CORPORATION 103 FOURTH AVENUE, NEW YORK 3, N. Y.

Other industrial equipment—by Hoffman: **AIR APPLIANCE DIVISION,** Multistage Centrifugal Blowers & Exhausters—Industrial Vacuum Cleaning, Portable and Stationary Systems—**PNEUMATIC CONVEYING DIVISION**—Custom Built Systems.

When large parts must be ground to total tolerances of .0005" or less . . . .

THOMPSON GRINDERS WITH THE NEW HYDRA-COOL HYDRAULIC SYSTEM SOLVE THE PROBLEM!



Machine ways up to 118" for The Michigan Tool Company's Roto-Flo Spline Rollers must be ground to .0005" total tolerance. Heat distortion, caused by hydraulic heat, became a critical problem in achieving this tolerance.

During the three months of operation since the installation of Thompson's new Hydra-Cool Hydraulic System*, these long ways are being ground to consistent .0003"-.0004" total tolerances. Heat distortion is eliminated. Scrap loss is reduced to zero. Grinding time is greatly reduced.

THOMPSON GRINDERS WITH THE NEW HYDRA-COOL HYDRAULIC SYSTEM MAY BE THE ECONOMICAL SOLUTION TO YOUR GRINDING PROBLEM. WRITE TODAY FOR FULL PARTICULARS.

Hydra-Cool also offers you these exclusive advantages:

- Heat damage to hydraulic seals, valves, controls and pump is eliminated.
- Break down of additive-type hydraulic oils is prevented—sludge will not form in the Hydra-Cool System.
- Lengthy warm-up periods are eliminated.
- Power costs are greatly reduced.

Hydra-Cool is standard on all Thompson surface grinders 40 inches and up in work length AT NO EXTRA COST.

Here's the Complete Story:

GRINDER: Thompson Type CXV 36" x 36" x 120" with horizontal and vertical heads.

PART: 118" way for Michigan Tool Co. Roto-Flo Spline Roller.

RATE OF TABLE TRAVEL: 100 ft./Min.

MATERIAL REMOVED: .065".

METAL: Flame hardened Ductile Iron.

WHEEL: 20x4x12 H Grade.

SCRAP LOSS: None.

GRINDING TIME: 3-4 hrs.

Thompson SURFACE GRINDERS

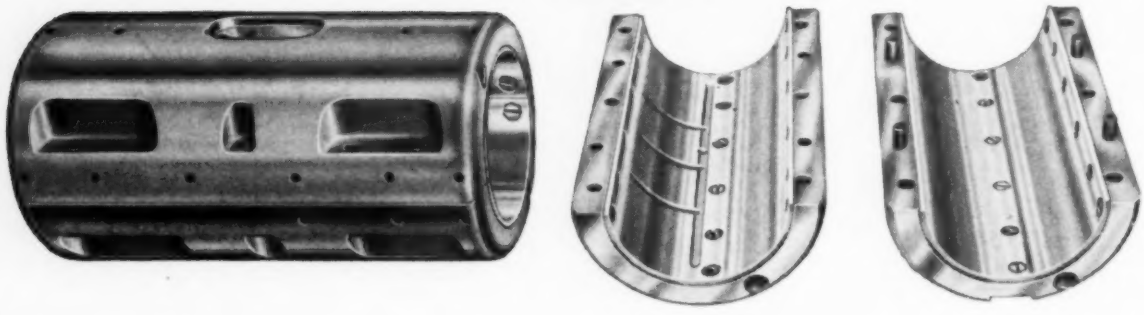
THE THOMPSON GRINDER CO., Springfield, Ohio, U. S. A.

*Pat. Applied For

*"Keep **THOMPSON** in mind for that daily grind"*

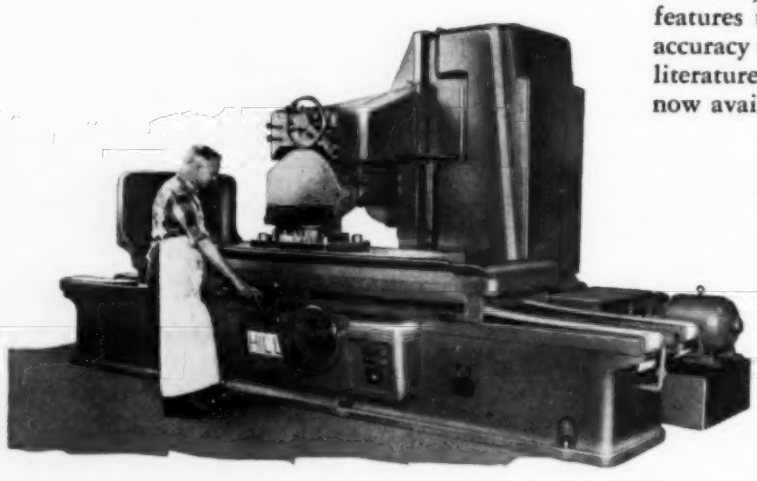
Novel Design provides *Astonishing Bearing Life*

The life of the HILL front spindle bearing on HILL horizontal spindle hydraulic surface grinders is truly astonishing. This bearing has been an *exclusive* HILL feature for more than 15 years. The necessity of replacement, under constant use, is practically unknown.



The front spindle bearing on HILL horizontal spindle hydraulic surface grinders was engineered by the HILL ACME COMPANY and has proven in the field to operate indefinitely. An alloy bronze bushing is fastened to a semi-steel casting with brass screws. The bronze bushing is undercut lengthwise in four equidistant locations on the outside diameter to allow for spindle expansion. (Darker areas in photo show undercut sections.) A perfect bearing surface is established in the I.D. of the bronze directly opposite the undercut sections. Oil is forced into specially designed concave relief areas which act as oil wedges assuring long bearing life. Hardened dowel pins guide the two halves together to their original position. The bottom half of the bearing has an oil return slot shown at the edge of the half section on the outside diameter. Note that there are NO oil grooves in this bottom half or in the quarter half of the top section. The shaft rotation spreads the oil film from the oil distribution grooves to the perfect bearing surfaces. Any additional oil grooves would act as scrapers and be detrimental to the oil film formed around the spindle.

This is just one of the many exclusive construction features that result in the longer life and permanent accuracy of HILL heavy duty surface grinders. Detailed literature on these high-precision machine tools is now available.



24" x 24" x 72" HILL horizontal spindle surface grinder grinding blanking dies to extremely close tolerances. Also built in Vertical Spindle design.

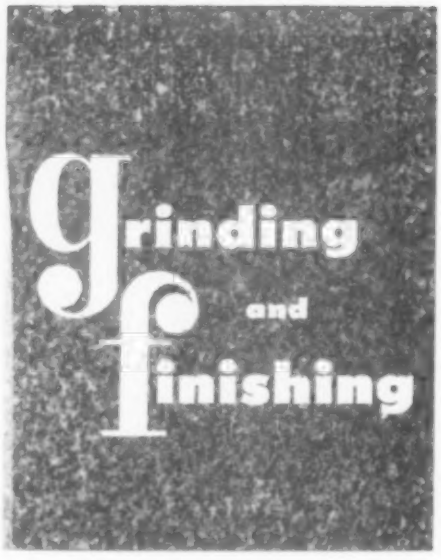
THE HILL ACME COMPANY

HILL DIVISION . . . . . **ESTABLISHED 1882**

1201 West 65th Street • **Cleveland 2, Ohio**

HILL ACME TOOLS FOR INDUSTRY

"HILL" GRINDING & POLISHING MACHINES • HYDRAULIC SURFACE GRINDERS • ALSO MANUFACTURERS OF "ACME" FORGING • THREADING • TAPPING MACHINES • "CANTON" ALLIGATOR SHEARS • BILLET SHEARS • "CLEVELAND" KNIVES • SHEAR BLADES



Editor's Page

Committees And You

The other day I sat in (like a nomadic guest) on several committee meetings of a manufacturers' association. Some people tend to be critically blase of this sort of thing and think of committees as well-intentioned do-nothing groups, or if they accomplish something it is usually slightly short of earth shaking. The old chestnut is frequently heard that the results and resolutions of committees are expressions of its most ineffectual member because a committee, like water, seeks its own level. I do not hold with this view beyond observing that here, as in all things, the good rubs shoulders with the bad.

One thing which impresses me about associations and their committees—the last one I attended was no exception—is their unselfishness. Too often we think associations, comprised of special segments of an industry, whether it be manufacturers or engineers, are purely selfish in their aims, adhering to constitutions and by-laws aimed at Rooking the Innocent and Unwary. Poppycock!

I have yet to attend a committee meeting in which the end user, or an entire industry, is not fixed concern of the members, not from the standpoint of sales, but service. How can the industry be helped is the keynote. My recent committee meetings concerned themselves with safety, standards, education, research and general industry problems. As we look at some of the associations in our metalworking field, can anyone doubt their value or their beneficial effect on our work and on our progress? Sometimes the industry is not aware of the days and months of unselfish time contributed gratis by committee members. For instance, take the Grinding Wheel Institute, composed of grinding wheel manufacturers. You may not know that the Institute supports research programs at Batelle and Cornell Aeronautical where additional knowledge is being gained on the performance of grinding wheels. Too technical now, perhaps, but tomorrow the benefit belongs to American industry in the form of even better grinding wheels. A committee put the show on the road!

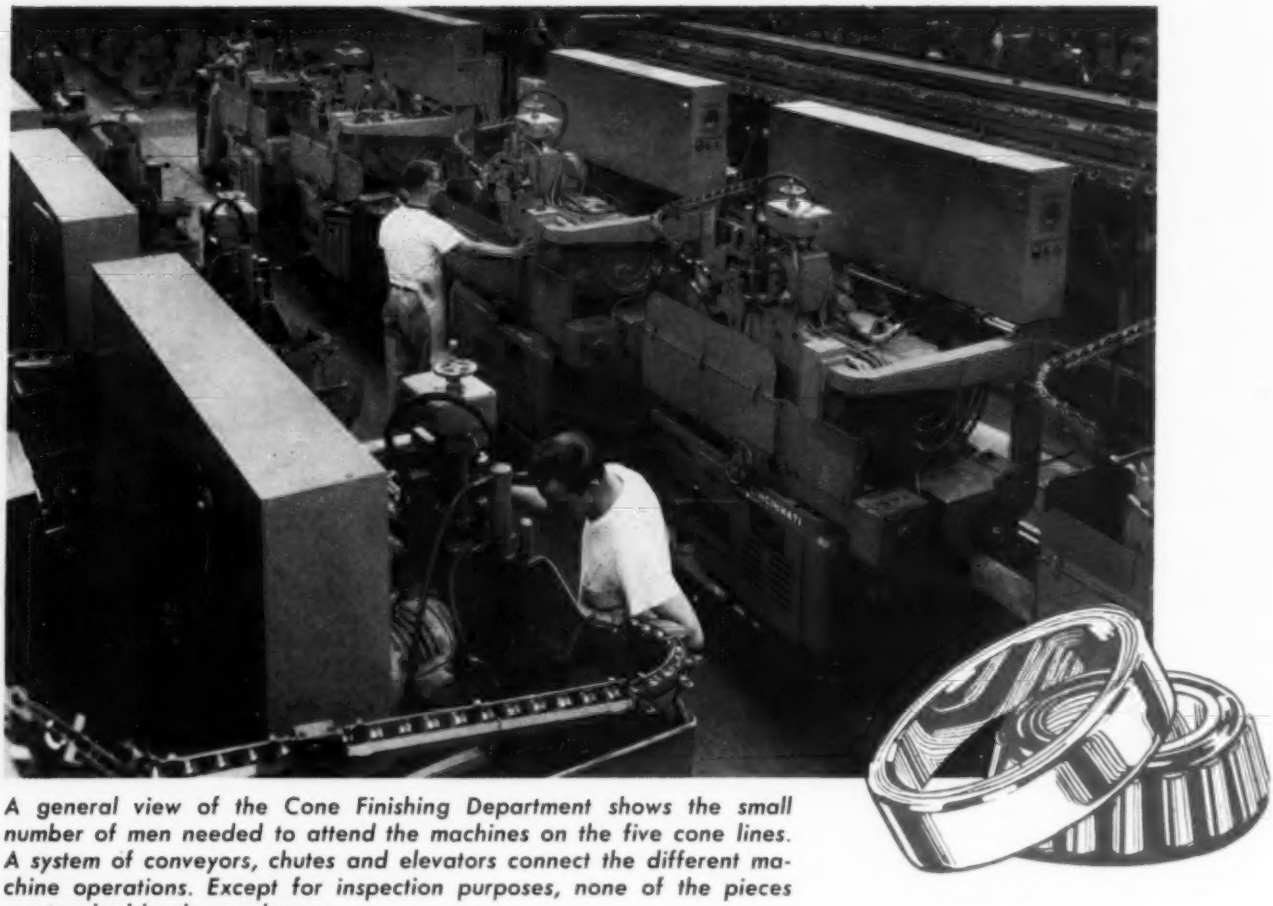
Safety . . . your safety . . . is of important concern. How can tests be improved? How can the user be educated to safe practices? What can be done to help the industry eliminate all accidents? These are the problems of a committee.

We all benefit from standards. The Institute, through a committee is vitally active, working closely with other groups, to help you realize economies from standard products.

And what of education? The Institute is revising its textbook, The Grinding Wheel . . . a committee is in charge . . . to help the user do a better job. Helpful booklets on many subjects are available at no cost.

SERVICE TO THE INDUSTRY . . . SERVICE TO THE USER is the law of associations and societies. Committees are the workhorses. By singling out the Grinding Wheel Institute I am not forgetting the American Society of Abrasive Engineers, A.S.T.E., A.S.M.E., Carbide Engineers, and the hundreds of other associations and their committees, all giving of their time and counsel, unselfishly, generously, so that American industry may be better served.

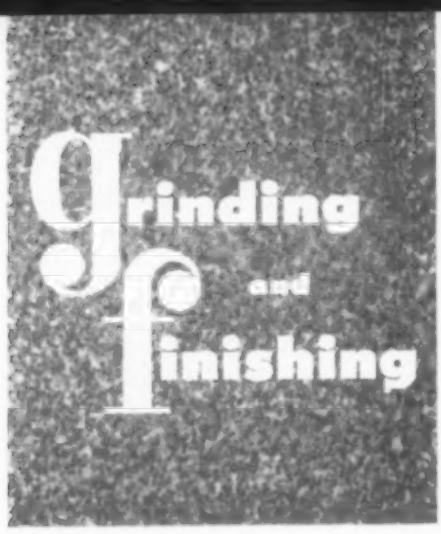
Wm. J. Schleicher



A general view of the Cone Finishing Department shows the small number of men needed to attend the machines on the five cone lines. A system of conveyors, chutes and elevators connect the different machine operations. Except for inspection purposes, none of the pieces are touched by the employees.

Lines four and five of the Cone Finishing Department show the 190 Heald Centrimatics that grind the bore of the cones. Tolerances are kept to .0005-in. or .0008-in. depending upon the quality ordered. Cycle time ranges from 14 to 25 seconds.

An investment of nearly 12 million dollars was made by The Timken Roller Bearing Company in the development of its new, high production bearing plant.



Grinding and Honing in Timken's Automated Bearing Plant

By **Darrell Ward,** Field Editor

- ✓ *production is 33,000,000 cups and 27,000,000 cones per year*
- ✓ *cost of plant was approximately $12 million*
- ✓ *plant is conveyorized, loading is automatic*
- ✓ *many holding, feeding and inspection devices were developed by Timken engineers*
- ✓ *on rough grinding wheel dressing is automatic*
- ✓ *grinding of bore in cone is held to .0005 to .0008-in.*
- ✓ *central coolant system is used. Capacity is 8,000 gallons for cup grinding and 9,000 gallons for cone grinding*

• The new Bucyrus plant of the Timken Roller Bearing Company represents a $12 million investment resulting in development of a straight line production capacity of 33,000,000 cups and 27 million cones per year in a completely automated layout. The plant produces 34 different cups and 17 different cones, but a total of 14 cups and cones constitute about 80% of the total volume.

Cup and cone grinding lines are in separate wings of the building. Each has five separate machine lines, and each grinding machine is equipped to feed, grind, and eject parts automatically. No human hand touches a part, except for special inspections, from the time that tube stock enters an automatic screw machine until finished bearings are sealed with grease and wrapped in rolls ready for packing in corrugated fiber cartons.

Alloy steel, SAE-4620, is produced in Timken's Canton steel mill. Billets are sent to their Wooster, Ohio, plant where the material is pierced into seamless tubing in sizes from 1¾" to 4½" O.D. Parts are machined and heat treated to a Rockwell C scale hardness of 62-63. The building in which green machining of both cups and cones is done is somewhat like the top cross mark on the Greek letter Pi. Cups enter their heat treating department at the upper connecting portion of the right leg of the Greek letter and cones enter theirs at a similar

A long shot of the number one cup line in the Cup Finishing Department shows the straight line manufacturing process.

Cups are conveyed from operation to operation by a system of conveyors, chutes and elevators. Except for inspection purposes none of the pieces are touched by human hands.

Bearing Plant

continued

location on the left leg. Therefore, it is appropriate to consider the cup line separate from the cone line for two reasons. The two sections of the plant are in separate wings, and because of the radical difference in the shape of the two parts, certain machine operations are different.

A Gardner grinds the front and back faces of cups simultaneously to a tolerance of plus or minus .002". Three different cup lines use a model 125 with wheels ranging from 23" to 26" diameter. Two lines use a model 630 with 30" wheels. All are regulated to a maximum of 6500 sfpm at the periphery of the wheel.

The wheels are not run parallel, but are toed in about .004" at the back for gradual removal of material as the cups feed through on guide rails. Rubber drive rolls push the cups in a continuous line. The cups rotate as they pass between the faces of the wheels, thus producing a desired cross hatch face pattern. There is .005" of material removed from the back and .010" removed from the front face of a cup of typical design. Tapered bearing design naturally requires a thinner front face section, but the width of the rim may vary considerably in different kinds of bearings as well as different sizes.

The actual ratio of front face to back face can range from 1:1 up to 1/16:3/8 in bearings produced at the Bucyrus plant.

The amount of material removed is controlled by hardness, grit and speeds of the two wheels rotating in opposite directions. On very thin faces, a wheel may be as fine as 120 grit, R hardness. On thick faces, wheels may go down to a 60 grit and G hardness. Timken uses perforated wheels to make freer cutting.

Speeds of the wheels may vary as much as 20%, the slower running wheels acting softer by breaking down faster and cutting faster.

The unique loading mechanism on the No. 2 Cincinnati Grinder was developed by the Timken Company. Cups fall into the loader from the gravity chute. Each stroke of the loading mechanism places cups in a horizontal column. Pressure is applied by a system of weights pushing the column of cups against the grinding head. It is important that the pressure be steady and that the cups feed through squarely. If the cups are not in a tight column they may fall sideways resulting in an off square grind. Too much pressure may cause an irregular finish on the O. D. surface.

The Moore Air Gauge provides a quick method of spot checking the outside diameter of the cup after it has been ground. Carbide inserts at the contact points prevent wear of the gauge.

But, when there are extreme differences in the ratio of cup faces, there may be a greater difference in cutting action required—greater than can be affected through speed alone. In such instances, wheels have to be changed to balance the amount of cut taken from each face.

Air gauges indicate spacing of the wheels. The gauges are marked for tolerance ranges to enable a machine attendant to keep the face grinding within a tolerance of plus-or-minus .002". The length of cups, face to face, is spot checked on pneumatic length gauges at the grinders.

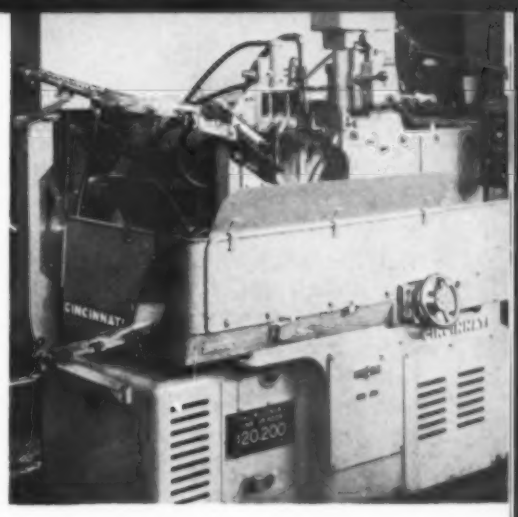
Each grinder can produce from 50 to 100 pieces per minute and wheel life ranges from 150 to 300 hours of continuous grinding. Both factors depend upon the size of wheel and size of cups being ground.

Wheels are dressed on the Gardners about once an hour, but each machine can grind enough cups in four hours to supply the rest of the line for eight hours. Therefore, dressing time for the wheel does not interfere with normal flow of production.

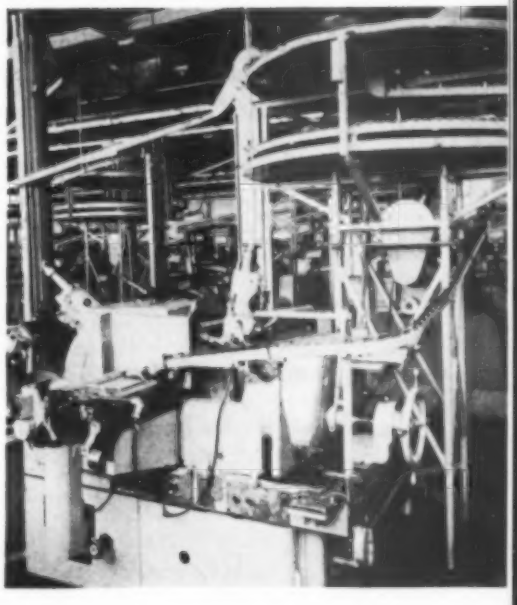
Double-decked spiral storage units provide lag time between the Gardners and subsequent operations, holding about two hours' supply of parts and permitting time for dressing the wheels, changing, making minor adjustments or repairs without holding up production.

Cups move from the spiral storage rack to rough O.D. grinding in a Cincinnati Centerless No. 2. About .007" is removed at this point. On line 1 another Cincinnati Centerless makes the finish pass, taking off another .002". But, on lines 2, 3, 4 and 5, where the larger cups are being run, there is an intermediate semi-finish grind done on the second of three similar machines. O.D. tolerance is kept to .001" with a 50 micro-inch finish.

The loading mechanism on these grinders was designed by Timken engineers. Cups fall into the loader from a gravity chute. Each stroke



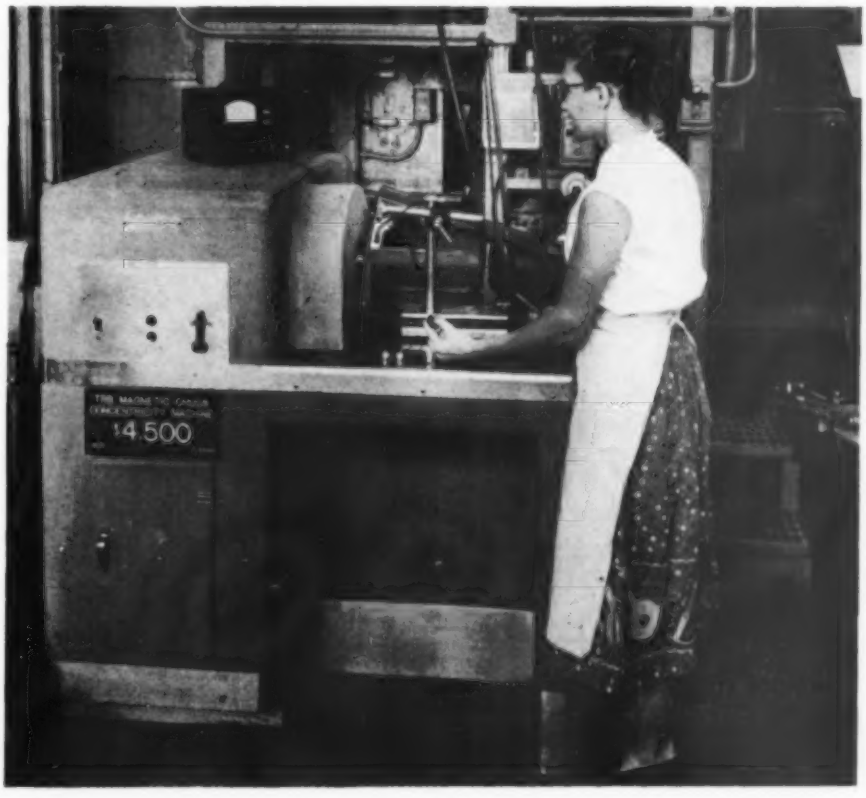
The one pass micro-centric grinder grinds the tapered O.D. raceway of cone. Cycle time per cone ranges from 9 to 17 seconds depending on the size of the cone.



Machine finish grinds cups O.D. to a tolerance of .001 at the rate of about 74 per minute. Varies according to size of cup being run. Spiral storage rack feeds cups into loader. Gauge mounted on right of machines provides quick method of checking cup sizes.

The machine finish grinds the cups O.D. to a tolerance of .001 up to 70 pieces a minute depending on the size of the cup being run. The spiral storage rack located above the machines provides lag time between grinding operations.

The feeding mechanism on this machine was designed by Timken company engineers.



The Timken Bearing Equipped magnetic chuck concentricity machine compares the O.D. to the I.D. for concentricity of the cone and the face to the rib for parallelism, and the O.D. to the I.D. The inspector checks cones from each grinding operation after each "blue check" inspection. Similar machines are used in the cup finishing department.

of the loading mechanism places cups in a horizontal column. Constant pressure is applied by weights pushing the column of cups against the grinding wheel at a uniform rate to maintain squareness and roundness.

A rheostat controls the regulating wheel speed which in turn controls the rate at which the cups pass thru the machine. The grinding wheel speed is set for 6500 sfpm on both the rough and finish grind. All wheels used for cup O.D. grinding are vitrified aluminum oxide, ranging from 60 to 80 grit with K or L hardness. Wheels for the No. 1, 2 and 3 lines (smaller size cups) are 20" x 6" x 2". Lines 4 and 5 take 24" x 8" x 12" wheels.

The control wheel is slightly skewed to pull cups through the grinder. The adjusting wheel on the side of the machine enables the operator to reset quickly for different size cups. A rough pass through the grinders can produce about 65 pieces per minute. Finish grinding produces 70.

Automatic wheel dressing for rough grinding is done with centered diamonds in automatic diamond turners. Finish grinding is stopped for periodic wheel dressing because of the possible marking of the bearing cup surface by particles of grit dressed from the wheel in operation.

Wheels are dressed every half hour to one hour intervals, depending on the amount of stock being removed. When the part shows perceptible out-of-roundness, or the work starts hitting heavy at the face of the wheel, the attendant dresses the wheel back to shape.

O.D. grinding of cups controls roundness of I.D. in later operations. Therefore, Timken holds the O.D. free of lobes within a tolerance of .00005". In order to hold this quality of roundness in O.D. grinding, the attendant must make very frequent checks for work height above the center, blade wear, skew of regulating wheel, rpm of regulating wheel, and such routine functions as directed in the machine manual.

Average wheel life in the O.D. rough grind ranges from 100 to 250 hours. Roughing removes from .006" to .014" in two to three passes.

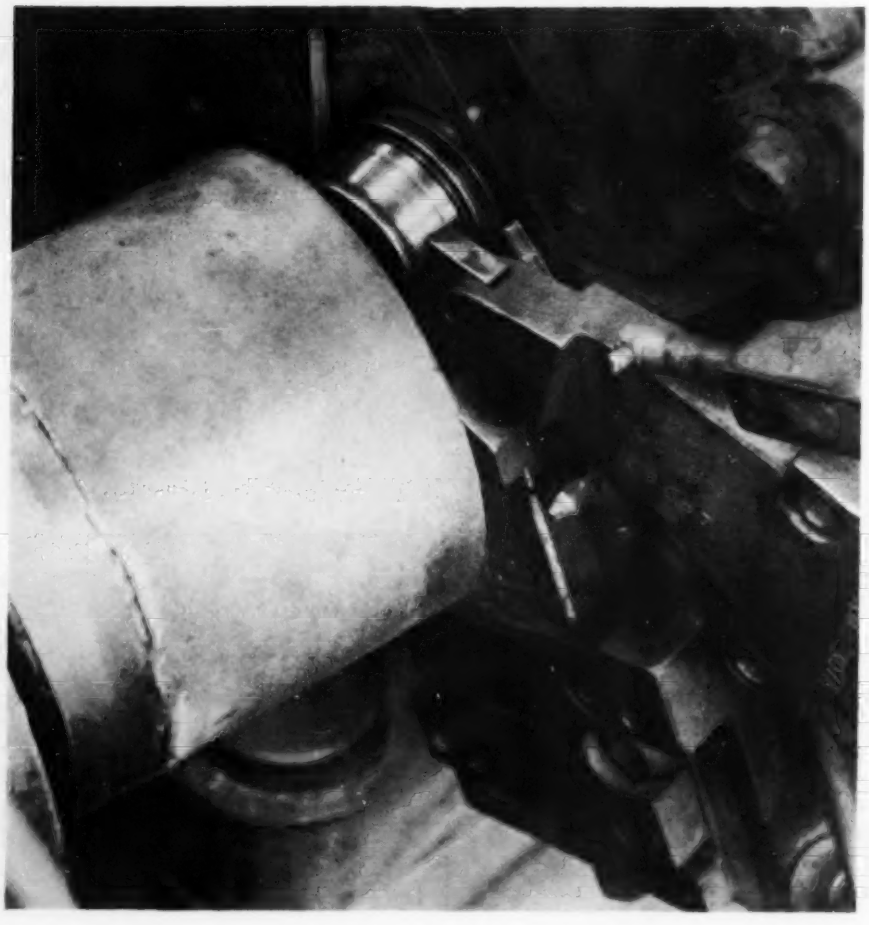
The tapered I.D. grinding of the race in cups is the longest and most critical operation in the cup lines. Diameter tolerance is kept to .0013" generally, with the exception of pinion bearings which are held to .0007". It takes one cup from 12 to 18 seconds to pass through the special Heald Grinders. These machines have been modified to incorporate features designed by Timken engineers.

An entrance chute to the grinder, for instance, has a backward stop gate to prevent cups from entering the machine in the wrong position. A loading finger drops cups into position. The traverse oscillates the grinding head with the wheel turning 22,000 rpm to maintain 6500 sfpm.

As the traverse retracts after each grind, the wheel is automatically dressed to maintain accuracy.

The cup wheel on the Timken Company designed rib grinding machines envelopes the cone as it grinds the rib. Carbide shoes riding on the raceway hold the cone in place. A diamond point (lower center) dresses the wheel as it reaches its highest point in the grinding process.

Cycle time varies from 7 to 12 seconds depending on the size of the cone being ground. The wheel specifications are 44A N8 B5.



The cup wheel used on the Timken Company designed automatic rib grinding machine grinds the rib of the cone. It is three inches in diameter and will grind about 1300 pieces per wheel.

Vitrified aluminum oxide wheels of 70 grit and M hardness are used on the Timken Heald Grinders. These machines are electrically and hydraulically powered. A central hydraulic system working 650 gallons of S.A.E. 10 oil through five Vickers V-46 hydraulic pumps at 180 psi powers all of the table traverses, wheel feed-ins, pressure and support rolls. Grinding wheel spindles are powered by electric motor.

Grinding cones is different from grinding cups in a number of detailed steps. This is because of the difference in shape and surface. Operations are similar for grinding to length in the Gardners, but different types of machines are used in many of the subsequent processes.

A Cincinnati Micro-centric grinds the tapered O.D. of the cones held by magnetic chuck and micro-centric shoes. Cycle time runs from 9 to 17 seconds. The wheel is dressed automatically after every 20 to 25 pieces. Wheels are changed for every third or fourth work shift. A pneumatic gauge is used for checking the stand and taper of the cone O.D.

The rib angle and radius are ground on a machine designed and built by Timken. In this machine, the cones are held by a magnetic chuck of Timken design which rotates the cone against the grinding wheel. A special device on the feed chute prevents cones from loading in reverse.

Unlike cups, the cone ribs are formed in one operation of the machining ahead of grinding. Due to the angular relationship between the rib center line and the wheel the part of the wheel contacting the conical rib generates itself to the correct angle. The part of the wheel contacting the radius breaks down to the hardstock contour. Therefore, it is unnecessary to dress the wheel to shape in the Timken rib grinder.

An aluminum oxide resin bonded cupped wheel is used with a 280 grit and L hardness. The thickness of the wheel allows a slight overhang around the radius at the outside of the cone rib. Thus, the wheel breaks down and assumes a natural radius form to match the radius of the cone. A fixed diamond dresser dresses the extended rough edge on the wheel as the overhang grows with grinding. The process is essentially a self-crush dressing of the wheel by the cone radius being ground, very similar to a technique applied to the grinding of an optically perfect radius on lenses.

A Jones and Lamson comparator checks the tolerances of the cone rib angle which is held to a plus-or-minus 0°-5′ of the proper degree. A profile of the rib angle is projected at 31.25 times magnification for this inspection. An air gauge checks the length of the rib.

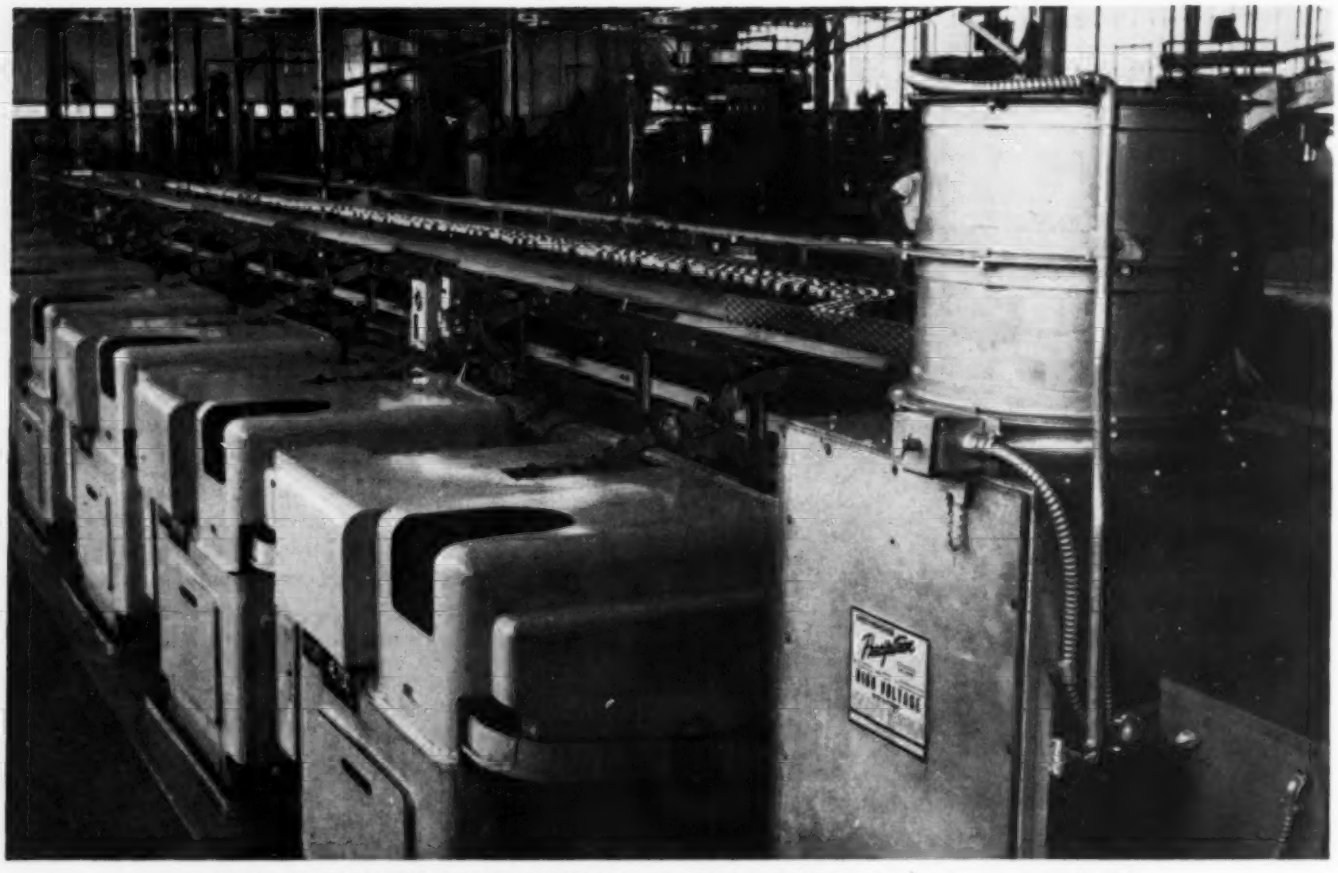
A Heald Centri-matic grinds the bore of a cone to a tolerance of .0005″ to .0008″, depending upon quality desired. Cycle time runs from 14 to 25 seconds per cone. The wheel is automatically dressed after each cone is ground. Wheels are changed about every 100 pieces.

Central coolant systems are used for each of the grinding departments, both using White & Bagley Economy 1888 coolant. However, the cup line coolant is a 2% solution made with softened water, while the cone line employs a 3% solution. A richer solution is required for cones because of a small groove near the rib which tends to retain moisture and produce rust. A higher oil content prevents this. On the other hand, it is not only more economical to use the leaner mixture for cups, it is a necessity to prevent slippage during grinding.

Coolant flows to the machines through an extensive piping system and returns to sludge tanks via metal lined trenches in the floor. A flotation unit is located adjacent to the plant building. Coolant is agitated in this tank, causing the heavy sludge to fall to the bottom and the light sludge to float to the top. A chain drag scrapes the bottom of the tank to pull the sludge up over an incline where it is piled up ready for hauling away. Lighter sludge floats off. Coolant flows to a clean cell through a filter screen. Clean coolant is pumped back into the header pipe for recirculation to the grinding machine at a pressure of 45 psi. The capacity of the systems is 8,000 gallons for cup grinding and 9,000 gallons for cones. • • •

The flotation unit located adjacent to the building housing the Cone Lines of the finishing department receives the liquid from the central coolant system. The coolant is agitated in the tank causing the heavy sludge to fall to the bottom and the light sludge to float to the top. A chain drag scrapes the bottom of the tank pulling the sludge over the inclined end of the tank. The sludge on the top floats off. The coolant then flows to a clean cell through a filter screen and is pumped back into the header pipe to be circulated through the grinding machines.

Timken hones raceways and rollers to get quiet running bearings and minimum initial wear



ROW OF TAPE HONING MACHINES in the Timken plant. Air ducts connected with each row draw the oil mist into a Precipitron (right) where high voltage separates the oil from the air and deposits it into a pan.

Honing the race for tapered roller bearings used in automobiles has not always been a standard practice. However, honing to an almost mirror-like finish (8 micro inch RMS) became inevitable as far back as 1936 when Timken began honing to meet the demands of the automotive industry for quieter bearings with less initial wear. Timken began honing to get down to base metal.

Practically all cups and cones produced by Timken have honed raceways. The bodies and ends of large number of rollers are also finished by honing.

While it is possible to attain a very good finish by grinding, it is more economical to use honing as the last operation. By this method it is possible to produce surface finishes of 6-8 micro inches which in turn results in quiet running bearings with very little initial wear.

Honing with abrasive stones solved the early wear problem, but it introduced other problems for a high speed production line. It was difficult to maintain the ticklish balance in hardness, structure and pressure applied, because if a stone happened to be a little too soft with good cutting qualities, it might cut a little too good. The result was loss of size control.

Many stones were tested and, to people in the shop, they did not appear to be uniform. Stone manufacturers claimed that it was not the stones but the metal. This kind of argument was hopeless for constructive solution.

Timken experimented with metal laps charged with various abrasives. The process was good and the finish excellent, but the method was not adapted to high rates of production.

That led to tests with tape lapping. First, tests were made with the tape pulled over the face of metal laps. This introduced a problem of contact area control. Tape requires a backing shoe of special shape to apply uniform pressure over the full area of contact, but making contour shoes, milled or ground to shape, was tedious and expensive. Otherwise, this method would be entirely satisfactory and

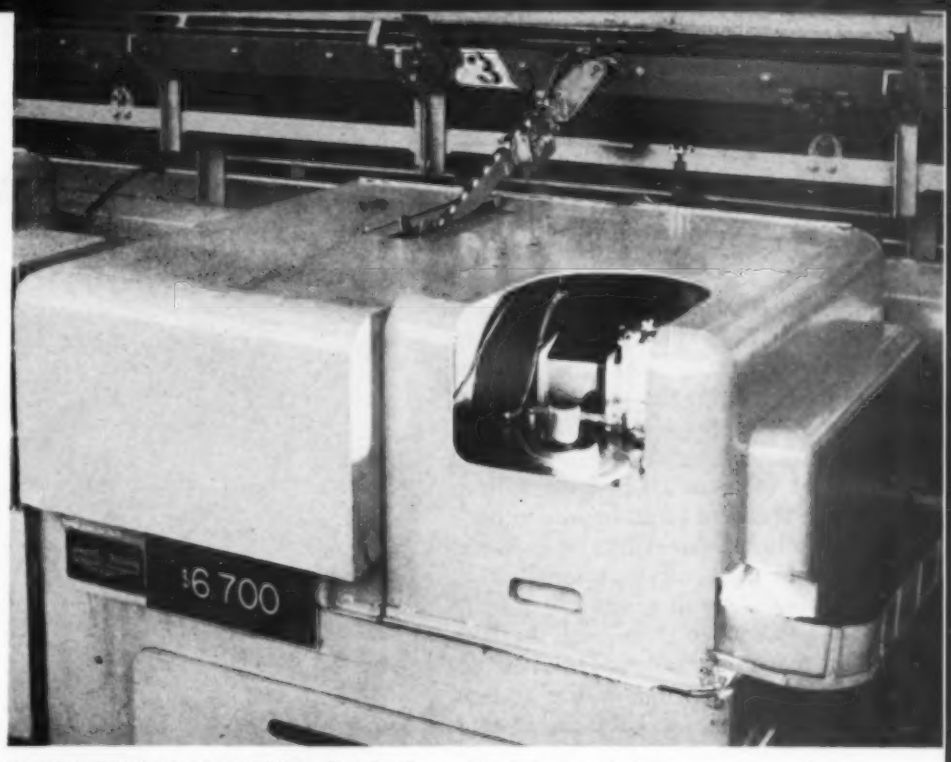
certainly could be adapted to high speed production.

After the problem had been tossed around for a time, someone came up with a simple solution. Why not use a honing stone for the shoe? It should be easy and fast. Merely begin the honing operation with a stone so it will break down to conform to the surface contour. When the stone glazes up enough to stop cutting, pull the tape across the face of the stone and present fresh abrasive as fast as required by index feeding the tape. The idea worked. That is exactly the principle on which the Timken Honing Machine was designed.

The method is completely practical and perfect control can be maintained. Perfect contours can be held in the backing shoe for the tape because the stone shoe has no further wear, once it is brought to shape and covered with tape. The amount of cutting action can be controlled easily by the amount of contact area and the amount of new tape fed across the shoe.

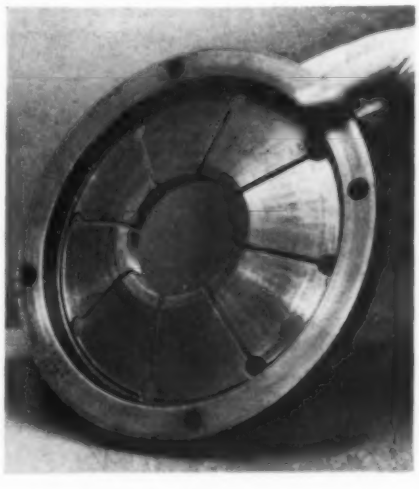
With the tape and shoe problem out of the way, Timken had not licked all their problems. They found they could not get the right kind of finish with standard honing solutions. They tested a 5% solution of lard oil in kerosene. This mixture is believed to be the best for a fine finish, but objectionable features of the kerosene ruled it out. Kerosene produces too much odor and too much skin irritation.

Mineral seal oil was substituted for the kerosene. This offered the advantages of kerosene but not the objectionable features. The mineral oil also provided a side benefit which eventually eliminated further steps of processing. After honing, parts are flushed with straight mineral seal oil before inspection. This eliminates the wash, dry and cooling steps otherwise required. And, the oil makes for better visual inspection by presenting a clean looking, smooth and uniform surface. Washing often leaves small deposits as the part dries. These mineral spots slow down or confuse the inspector. Each spot must be individually wiped before the inspector can be certain that the waterspot is not a defect in the honed surface. A mineral seal oil flushing eliminates the problem altogether.



TAPE HONING MACHINES finish the critical tapered I.D. raceway of the bearing cup to an 8 micro-inch (.000008). A cup can be honed in from 8 to 12 seconds depending upon its size. View shows honing tape reel. In the background is the feed chute and feed belt.

Cup honing is done on tape honing machines designed by Timken and built at a cost of $6,700 each. The cup is held in place by means of a rotating diaphragm chuck while the honing tape, backed by a reed type honing head, oscillates against the tapered I.D.



DIAPHRAGM FOR THE DIAPHRAGM CHUCK used on the cup honing machines. These are change parts. The pieces feed through the chuck (convex side out) opening the jaws and holding the cups firmly in place. When the contact points become worn the chuck can be spray welded and reground making it possible to use the chuck over and over again.

Each cup is finished to a maximum finish tolerance of .000008" in an 8- to 12-second cycle. The honing head retracts and feeds from ¼-in. to 1-in. of tape, depending on size of piece being honed. A new cup feeds through into the chuck and automatically ejects the finished cup into a conveyor below.

The critical O.D. of cones is finished on a tape honing machine to tolerances similar to the I.D. of cups: .000008". But, instead of being held by a diaphragm chuck as are the cups, cones are held and rotated by tapered rollers. The honing tape is on a spool which feeds from about ¼" to 1" of tape per cycle, again depending upon the size of the part being honed. The honing head, itself, oscillates 3/32" with a continuous flow of mineral seal oil lubricating the tape.

The tape used at Timken for honing has a 220 grit (6/0 grain) on "E" weight paper, full coated, resin bond. When the tape reel is nearly empty, a light flashes for the attention of the attendant. A new reel of tape can be installed in about one minute. During the honing operation, it is the copious flow of mineral seal oil on the tape which provides the final ideal con-

Bearing Plant

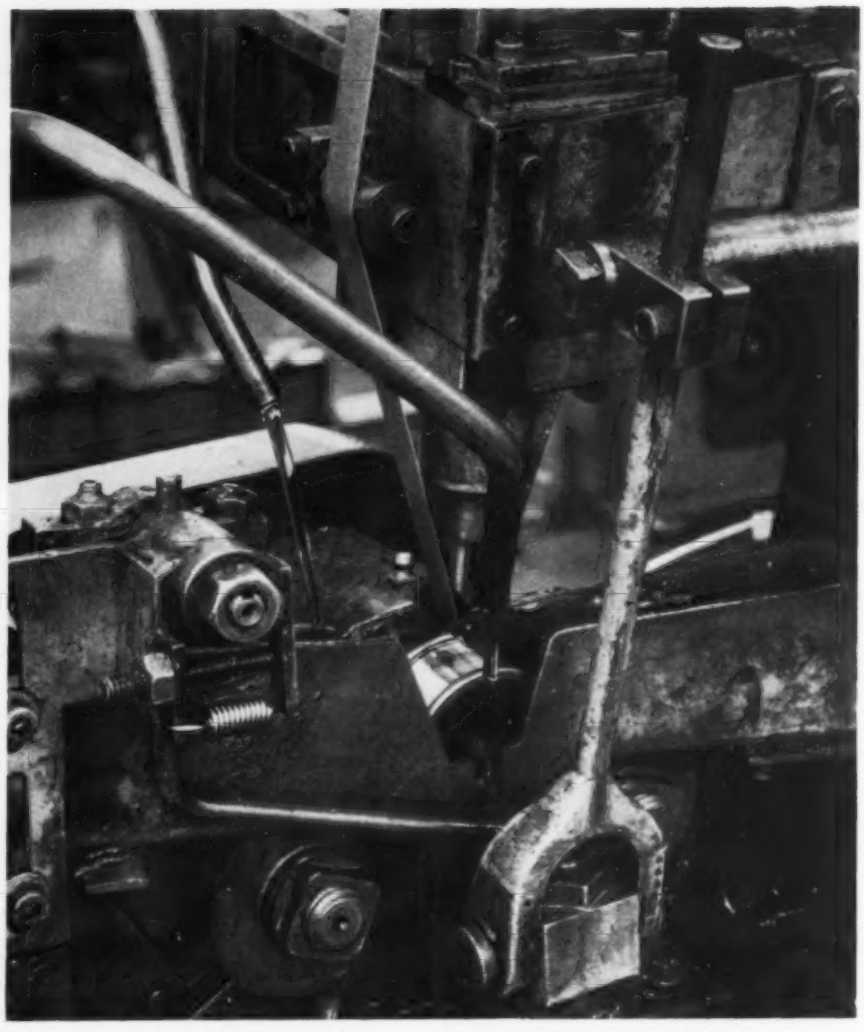
continued

dition for the micro-finish now required by the automotive industry.

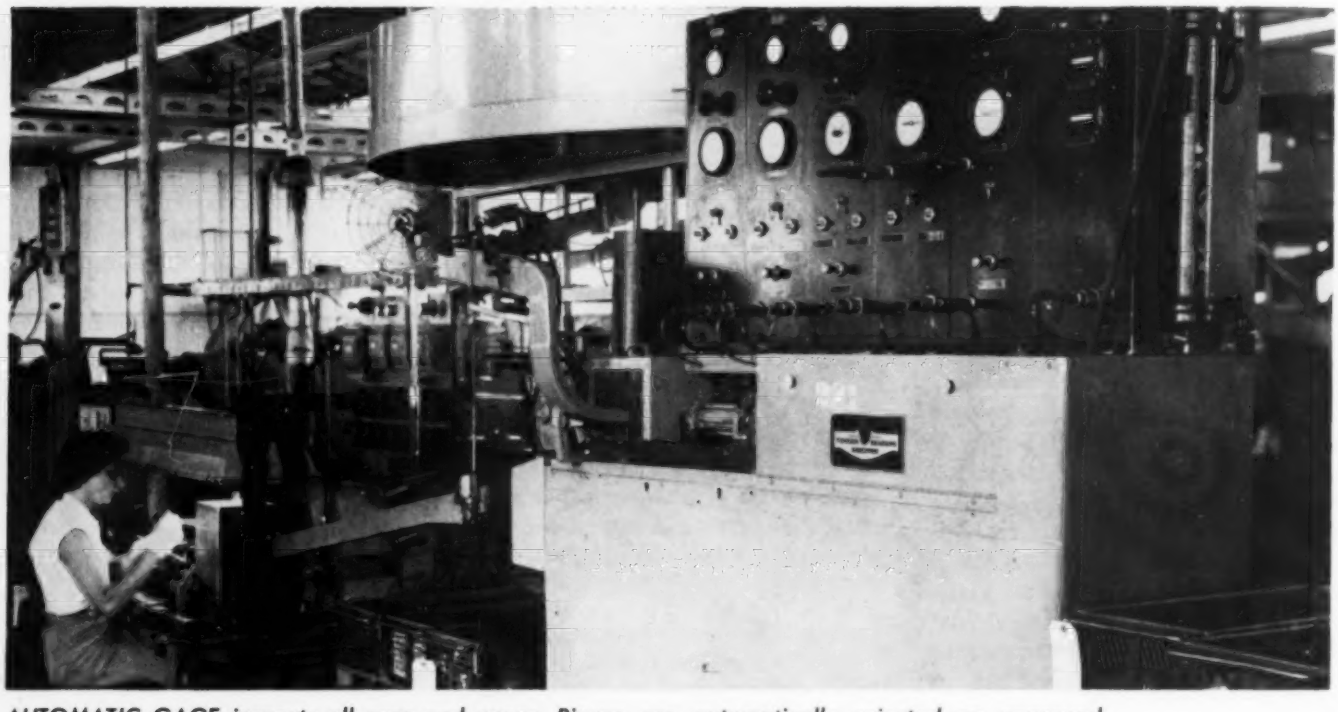
A central system supplies the mineral seal oil to all of the honing machines. This is a system entirely separate from the coolant system serving the grinding operations. The mineral seal oil flows off to a collection tank outside by means of a trench under the floor level. It is filtered and pumped back to the honing machines. It is necessary to add oil occasionally because of the film left clinging to the parts when they leave the honing machines. But, it is not necessary to change oil in the system. A filter screen in the settling tank is charged with diatomaceous earth and is recharged periodically.

An oil mist spray lubricates and cleans all the moving parts of the honing machines. Oil is sprayed under pressure to eliminate grit inside the machine housings. One unit serves four machines with four ounces of oil required for each unit.

Air ducts connected with each row of machines draw the oil mist into a Precipitron where high voltage separates the oil from the air and deposits it into a pan The pan is emptied back into the pumping unit as required. • • •



HOW THE RACEWAY IS HONED on the cone tape honing machine. One-eighth inch of new tape is used on each piece. Mineral seal oil is used as a honing lubricant.

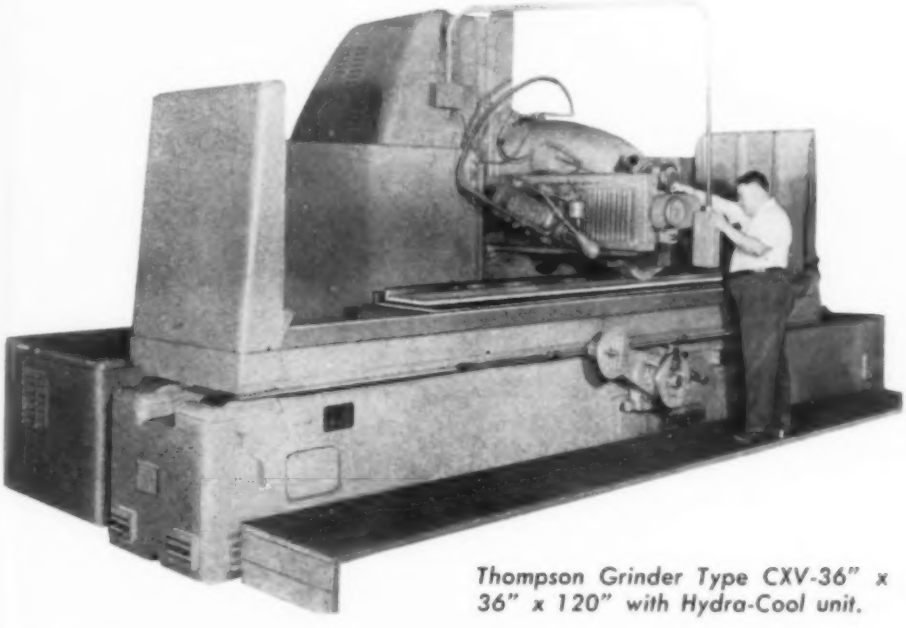


AUTOMATIC GAGE inspects all cups and cones. Pieces are automatically rejected or approved. Cups and cones receive an oil rinse in the circular storage rack before being visually inspected.

How Heat Distortion Affects Large Surface Grinders

- *tests have shown variation of distortion with different types of hydraulic systems.*
- *in spite of solid construction heat from the hydraulic system can destroy the accuracy.*
- *distortion becomes critical in machines of 40 inches and up in work length.*
- *heat is damaging to seals, gaskets and even to valves and controls.*
- *heat will break down new additive-type oils.*

by **John C. Wilson**
Vice President
Thompson Grinder Company

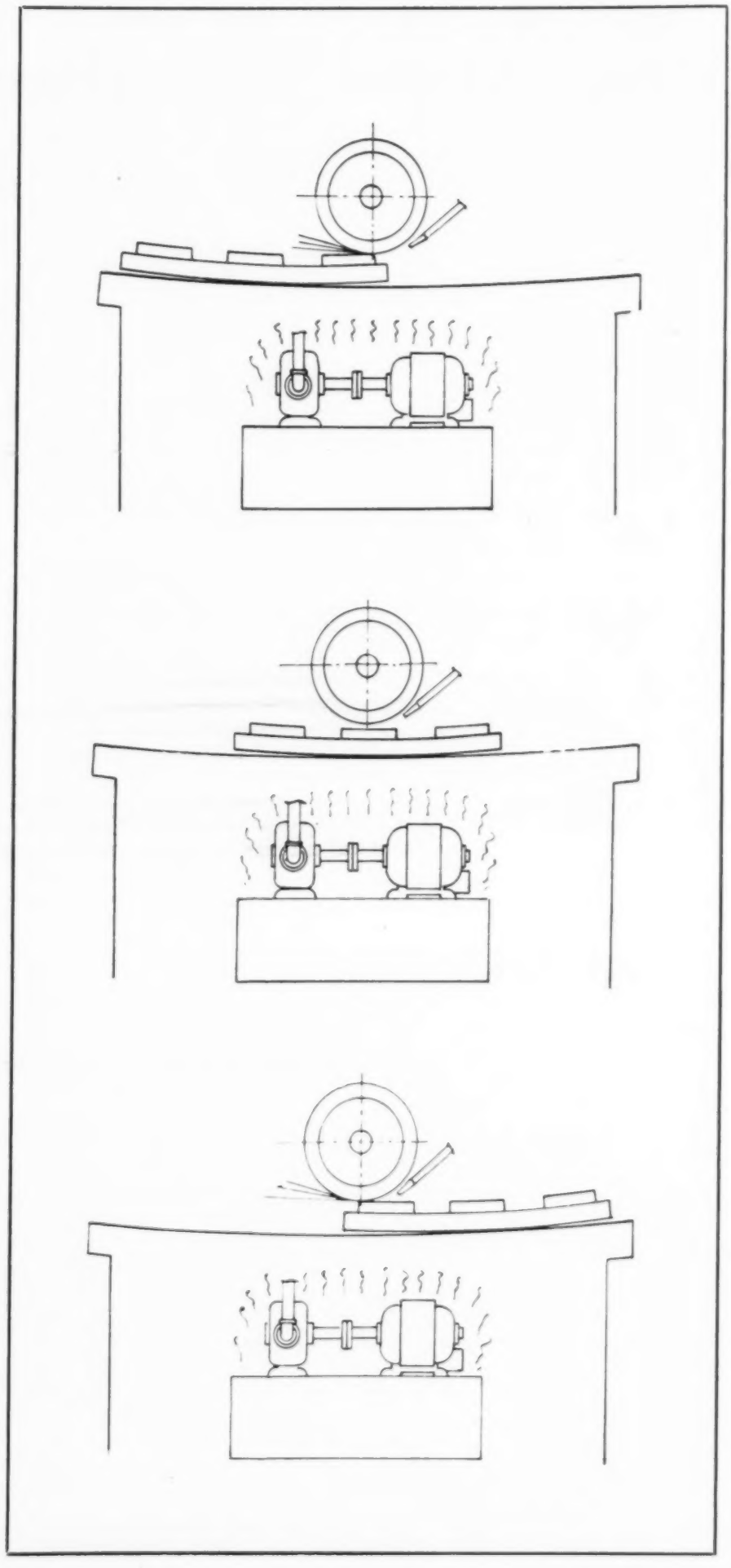


Thompson Grinder Type CXV-36" x 36" x 120" with Hydra-Cool unit.

Although the metalworking industry in general is undoubtedly aware of the harmful effects of heat on its many operations, few may realize how critical the heat problem is in the operation of surface grinders, especially when work must be held to very close tolerances during long, continuous production runs.

To better understand this heat problem, let us briefly review the basic construction of a surface grinder designed for medium or heavy duty production work. Heavy, solid construction is used throughout, with massive weight concentrated in the strongly-ribbed base of the machine. Rigidity and total absence of vibration are fundamental requirements of this construction. On some machines, the work table and head move on hardened ways which are ground to very close tolerances. Proper weight distribution is another fundamental requirement. In short, the whole machine is designed

These three simple line drawings show in exaggerated form what happens when hydraulic heat distorts a surface grinder.



specifically for fine precision work on which closely controlled tolerances for surface flatness and parallelism usually run to ten thousandths and frequently to millionths of an inch. When a factor, such as heat, destroys the accuracy of such a machine, it becomes clear how serious this heat problem is.

In the case of medium and heavy duty surface grinders, which are mostly operated hydraulically, this heat is generated by the hydraulic system, generally located in the bed of the machine beneath the work table. Tests run on several types of surface grinders equipped with different types of hydraulic systems show that this heat ranges from 40 to 70 degrees above ambient temperatures. It is these high temperatures that cause a general distortion of the whole machine and, in particular, of the work table. The top surface of the work table, cooled by the splashing and evaporation of the coolant, contracts; while the bottom surface of the table, heated by the hydraulic system, expands. This warpage causes the work table to become concave in form and any work being ground on it is ground too heavily on the ends of the table and too lightly in the middle. Besides warping the work table, hydraulic heat also distorts the column of a surface grinder from its true vertical alignment, thus further destroying the machine's accuracy. Under such conditions, close tolerances cannot be held and surface flatness and parallelism cannot be maintained.

In general practice, it may be said that this distortion problem becomes critical in machines of approximately 40 inches and up in work length, and increases in direct proportion as the work length increases. On the smaller size grinders, such as tool room grinders and even short table production grinders, this heat distortion is not so critical because the longitudinal dimensions are not as great. These smaller grinders are usually used

(continued)

for intermittent work, with no long production runs being sustained. Such machines carry a small load of work; fixtures are lighter and table cycles are normally shorter. Pressures are also lower and heat generation beneath the table is, in general, not a serious problem. It is on the larger production grinders which frequently operate continuously during two or three shifts, that heat distortion becomes truly critical.

Although we have dealt above mainly with heat distortion and its adverse effect on precision grinding, there are also other problems which this same hydraulic heat presents to surface grinding operations. Akin to the heat distortion problem is the fact that, in most cases, a production surface grinder must be subjected to a "warm-up" period before its regular production begins. Often the machine must be turned on several hours before normal working time to bring it "up to working temperature"—a practice which is both costly and inconvenient.

Heat is injurious to the hydraulic system itself. It is damaging to the seals, gaskets and even to the valves and controls after continuous operation under pressure conditions. Perhaps the most serious effect, in this regard, is the self-destruction of the hydraulic pump.

Pressure compensating mechanism (high-lighted) is the control feature of the Hydra-Cool hydraulic system.

Hydraulic heat is also presently causing concern to users of the new additive-type hydraulic oils. It is found that hydraulic heat will break down or "crack" these oils and cause the formation of sludge, which is highly damaging to any hydraulic system. Cases are on record where this oil breakdown has occurred and the entire hydraulic system had to be disassembled, cleaned of sludge and reassembled before the grinder could be operated.

With hydraulic heat being the serious problem it is in surface grinder operation, many methods have been and are presently used to control it. Heat exchangers, refrigerators, water coolers and insulation are some of the devices that will be found on surface grinders being manufactured today. While many grinding operations would be impossible to control without these cooling devices, it nevertheless is a fact that none of them are 100% effective in the control of oil temperature.

A new hydraulic system, called Hydra-Cool, developed by The Thompson Grinder Company, Springfield, Ohio, offers inherent design advantages in the control of hydraulic heat. This new system never pumps more oil than the amount required, nor at a higher pressure than is required.

The pump, which is the heart of the Hydra-Cool System, is a self-compensating, variable displacement, vane type unit that automatically compensates for pressure requirements throughout each cycle of the table. The circuit contains no relief valves—only a simple spring-loaded rotor positioning device that reacts against pressure demand of the work load.

A series of actual machine operation tests were conducted to determine the relative value of the hydraulic systems. These tests were conducted on a medium-size hydraulic production type surface grinder powered with 3 HP on the hydraulic system. To make the tests conclusive, a heavy work load was placed on the table and frequent starts and stops, as well as slow and fast table speeds, were in effect all during the test.

Test No. 1—Constant Volume System

For the first test, the surface grinder was equipped with a constant volume pump of correct size and specifications. During a continuous 24-hour production run, readings showed that oil temperatures in the system rose as much as 70 degrees above ambient temperature. A general distortion took place in the machine and surface flatness and parallelism were impossible to maintain.

Test No. 2—Variable Volume System

For the second test, a variable volume pump was used, which limited the rate of oil flow through the system to only that needed for table and head movement. During the identical 24-hour test of this type of system, oil temperatures beneath the table of the grinder rose to 35-40 degrees above ambient room temperature—a slight improvement over the constant volume system.

Test No. 3—Hydra-Cool System

During the identical 24-hour test, the Thompson Hydra-Cool System* showed only a 3-degree rise in oil temperature above ambient room temperature. General machine distortion is almost totally eliminated, and surface flatness, as well as parallelism, can be maintained continuously. By eliminating the customary warm-up periods, further savings in power costs are effected, and the productive time in both the machine's day and the operator's day is substantially increased. • • •

*Pat. Applied For

He proved that 1 wheel could o

Jim Frederick's eleven years of experience as an abrasive engineer have covered most of the problems in the book. That's why he so often finds practical solutions when he runs into problems that are *not* in the book.

Steelcraft operator John Kulpa checks performance of new Bay State wheel on high speed steel form tool job.

d outperform 3 at Steelcraft Tool Co.

Steelcraft Tool Co., of Detroit, used to use three different grinding wheels to rough and finish the angles on straight high speed steel form tools . . . one specification for roughing, two for finishing. Then Bay State came into the picture through distributor Jim Frederick of Detroit's Industrial Abrasives Co. He showed them how a single Bay State wheel specification would cut *fast* for roughing and *fine* for finishing.

Result: The new wheel eliminated the need for repeated wheel changes and both Roland Belardnelli, co-owner of Steelcraft, and John Kulpa, chief operator, rate it A-plus for speed and precision, too.

Why not talk to *your* Bay State distributor? Chances are he'll come up with more than one cost-saving idea for your grinding operations.

Better grinding at lower cost – that is his business.

BAY STATE
WHEELS of PROGRESS

BAY STATE ABRASIVES

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., Brantford, Ontario.
Branch Offices: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh. *Distributors:* All principal cities.

look your problem in the eye

No need to scratch around for a solution to your grinding wheel problems. Switch to CINCINNATI (PD)° WHEELS. For *now* CINCINNATI GRINDING WHEELS offer POSITIVE DUPLICATION—a remarkable achievement in precision manufacturing and quality control that *can save you money . . . and increase your production.*

And there's no reason to howl when it comes time to duplicate the original wheel when you reorder, for CINCINNATI (PD) WHEELS assure you of POSITIVE DUPLICATION of the original wheel every time you reorder. "On Grade" with a CINCINNATI (PD) WHEEL means all future (PD) wheels will perform and grind exactly alike.

Yet, CINCINNATI (PD) WHEELS will cost you no more than ordinary wheels.

So, today, see your CINCINNATI GRINDING WHEELS Distributor. He'll be glad to explain how (PD) WHEELS will save you money and increase production. Or contact us direct and we'll send one of our representatives—specialists who know grinding and grinding machines as well as grinding wheels. Write, wire, or telephone Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

Remember—only CINCINNATI GRINDING WHEELS give you

(PD) POSITIVE DUPLICATION

CINCINNATI
Grinding Wheels

°Trade Mark Reg. U.S. Pat. Off.

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

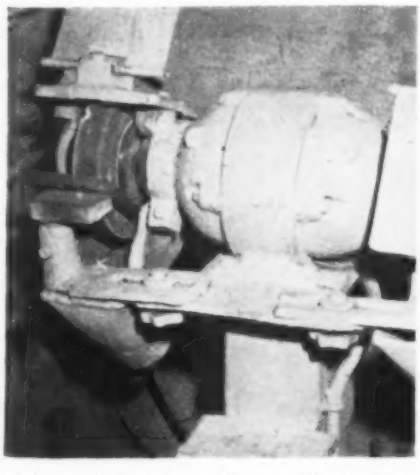
Surface grinding with large segmental wheel vertical spindle machine is one of the safest types of grinding. As shown in this and the picture at right, grinding area is completely covered by movable shield, so that in the event of wheel breakage, the broken bits of abrasive are completely contained within the metal walls surrounding both wheel and work. Manufacturers of all types of precision and production grinding equipment have used great ingenuity in making this equipment as fool-proof as possible.

GRINDING Safely

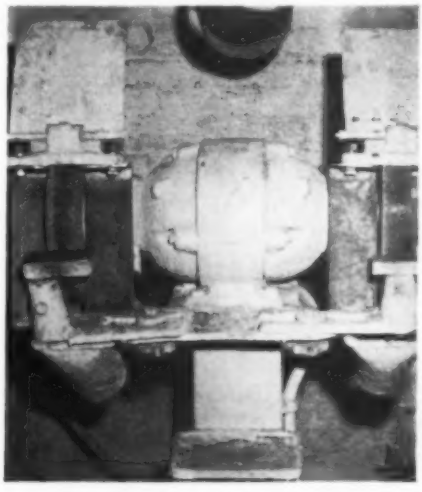
by **Edmund Mottershead,** President
Mottershead Associates, Chicago

Manufacturers of grinding equipment, and most users of these devices, all recognize that while grinding is essentially a safe activity, there are potential hazards springing from improper use of the equipment, from wheel breakage, and from failure to wear adequate eye and face protection.

Thus, the grinding industry has set standards of safety, including standards of guarding, safe operating speeds for different classifications of wheels, proper mounting with flanges or blotters, and other matters relating to safe and proper operation of the equipment.

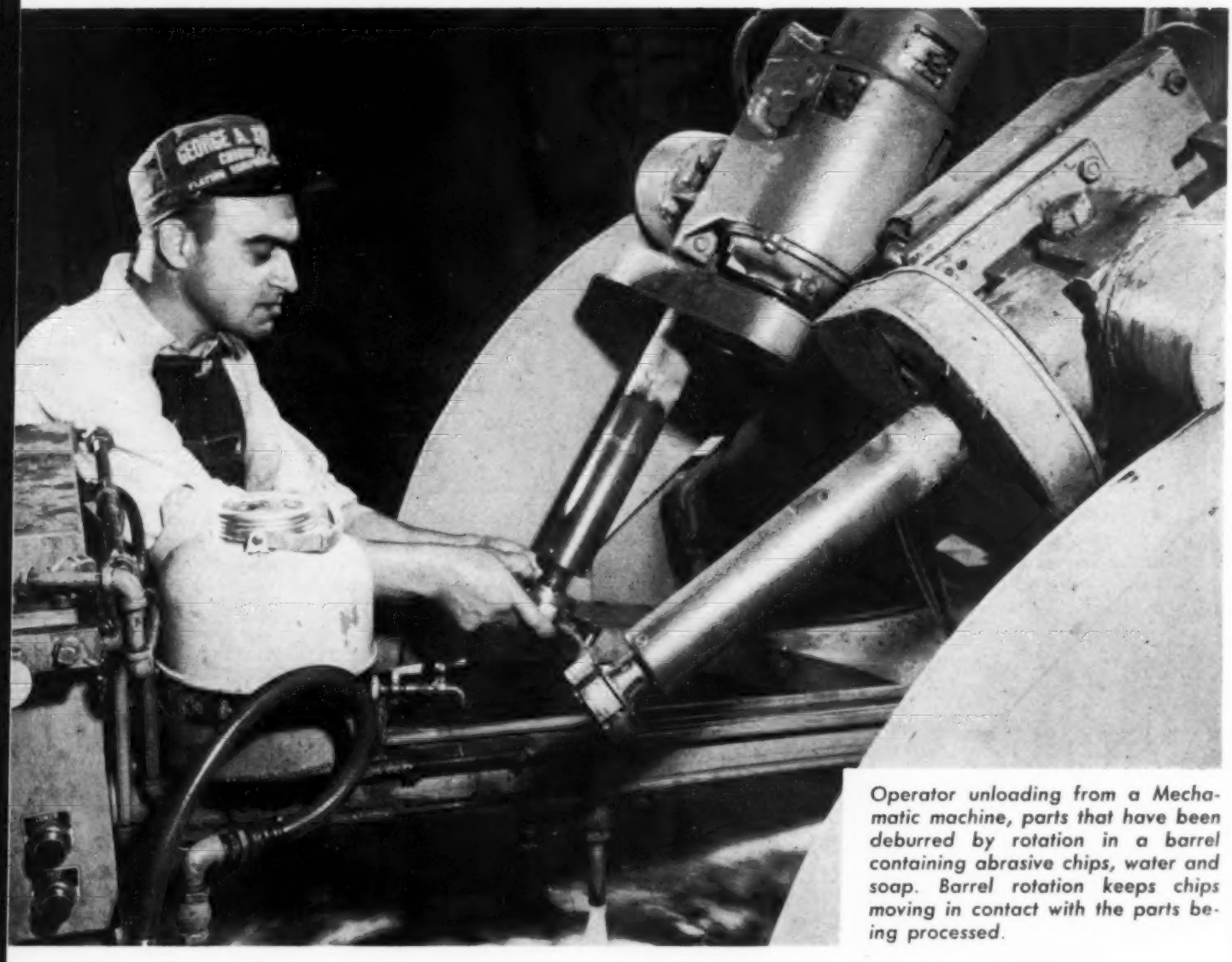


Where there's a will . . . if it's possible to do it wrong, somebody will find it. Workmen grinding rough tapers on these cope keys were subject to repeated accidents where the end of the rod slipped between wheel and housing, usually because they were improperly grinding on the side of the wheel. Safety engineers eliminated both the side grinding and the accidents with the simple permanent guards shown installed on each side of the wheel.



A great deal of thought and care have gone into the provision of guards and safety devices of all kinds, ranging from hood flaps to drop over the stand grinding wheel after use, to the glass shield-switch which pulls a protective shield across the wheel when it is turned on.

At the same time, users of this equipment have developed many additional guards and other safety devices suitable for their own special problems. With all this, there is still the constant need for operator training and adequate supervision to see to it that operators use the machines correctly so as to do good work and do it safely.



Operator unloading from a Mechamatic machine, parts that have been deburred by rotation in a barrel containing abrasive chips, water and soap. Barrel rotation keeps chips moving in contact with the parts being processed.

How Hupp Solved Visual Finish and Deburring Problem

√ Mechamatic finishing has answered aircraft engine industry requirements for visual inspection

√ All surfaces are finished to the same luster

√ For suitable parts there is labor savings and uniformity attained.

By **Darrell Ward**
Field Editor

• Several different steel aircraft engine and tank transmission components produced by Hupp Aviation Division of Hupp Corporation, Chicago, require that burrs be removed and edges be rounded slightly after machining is completed. Parts include gears and jaw clutch components. This work is done effectively and at low cost by a Mecha-Finish Corp., Sturgis,

Mich., "Mechamatic" machine, here illustrated.

Mechamatic finishing was chosen because the aircraft engine industry is particularly interested in visual inspection on these parts. When an engine is being run in and tested for the first time, all parts are checked closely by visual inspection and all of the lubricant is removed from the engine for complete analysis. They check thoroughly for all traces of metal picked up from any part of the engine assembly. They trace the exact origin of each particle to see just which part gave up the particle. That part may then be questioned and rejected back to the contractor who made that particular part. Hupp has found that they could safeguard themselves against possible rejection of engine parts better with the Mechamatic than with any other means of deburring and finishing.

The nicks and scratches that sometimes accompany barrel finishing are not the only sources of rejects from government inspectors. Even standard deburring and Tampico brushing of parts will leave traces of burrs and amorphous metal on surfaces which will result in rejects.

The Mechamatic not only cleans up all traces of minor burrs, but will give a finish exactly twice as fine as the original surface first put into the machine. This is because the operation knocks off the peaks but leaves the valleys.

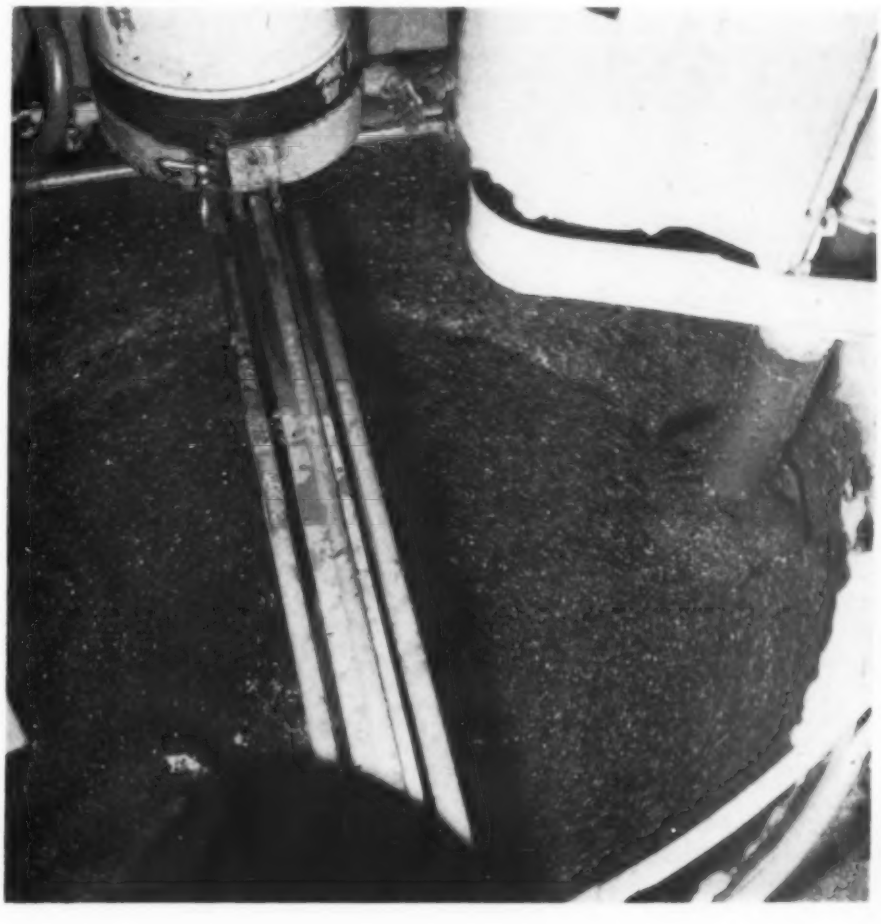
A feature of this kind of finishing which appeals strongly to Hupp is that you may have three or four different finishes on the part. You may have one surface that is turned, another surface ground, another rotary ground, and another that is milled. This kind of situation normally gives you the visual appearance of four different "colors" to the surfaces of the part. The Mechamatic will reduce all these different finishes to the same appearance to make a more uniform visual finish. This feature alone tends to cause greater acceptance on visual inspection, provided other factors meet the specifications of the part.

Parts for processing are clamped at the lower ends of two spindles that are alternately rocked up for loading. Work pieces are held by air operated expanding mandrels. After clamping, the spindles are rocked downward to vertical position submerging the work pieces in manufactured abrasive chips of various sizes.

The abrasive is No. 8 Mecha finish aluminum oxide chips manufactured especially for this machine.

Upon submersion, the parts are rotated at a spindle speed of 10 rpm. As the parts rotate in the chips, the tub containing the chips revolves at 40 rpm. The spout in the center of the picture carries a small continuous flow of water to the center of the barrel. Also dripped (slowly) into the tub through the jug spout seen in the photos is heavy liquid soap intended to improve cutting action and to keep chips from glazing or loading up. Centrifugal force carries the water, freed abrasive, detergent and metal particles to the outer wall of the barrel, hence the chips are continually flushed but not submerged in the water. The barrel side is stainless steel screen to allow the water to drain off.

Time per piece is varied to suit the work required and depends partly upon the nature of the burrs and the degree of rounding of edges specified. This time is predetermined and is set on a timer for each spindle, providing a range



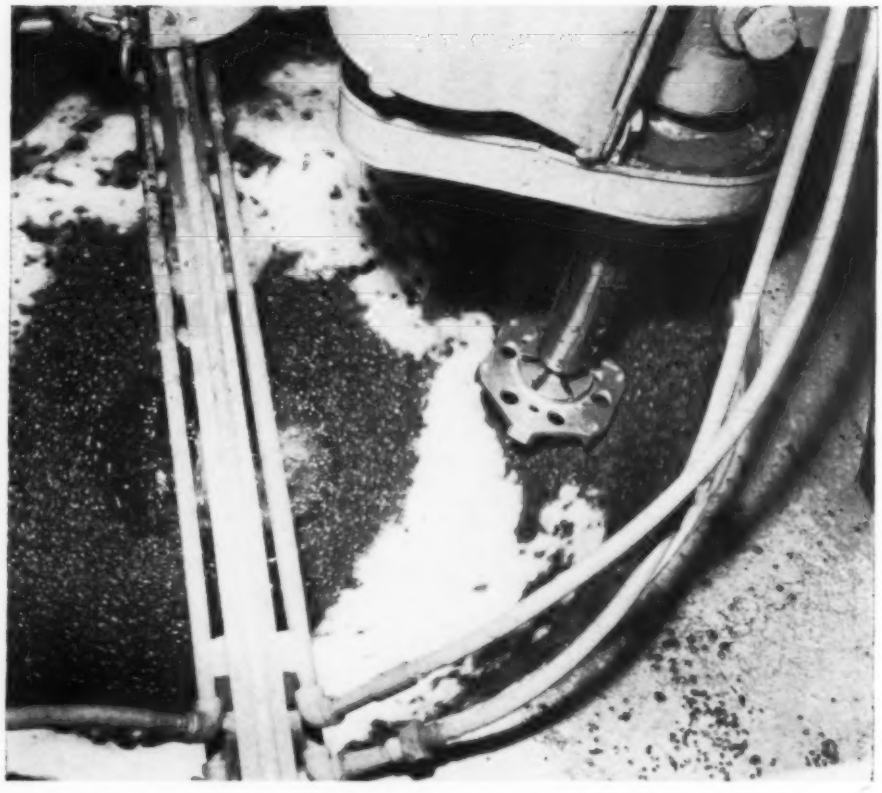
Spindle has submerged the part in the abrasive. The jug spout is shown in the upper left corner. The coolant spout is located under the bar passing over the center of the barrel.

of cycle time from 0 to 30 minutes. A normal run is 1½ to 2 minutes for the part shown. When the interval ends, the spindle and the work piece lifts out of the chips. Each spindle then stops and is unloaded and reloaded for a new cycle.

Parts removed from the machine will rust immediately on contact with air because of the base metal exposed. To prevent rust, parts are dipped in oil.

Deburring is faster and is uniform for parts in a given condition. When deburring was done by hand, uniformity was not attained and the deburring was relatively slow. If parts have heavy burrs, however, they have to be removed by hand before the operation described; otherwise, the machine will cause the burrs to bend back *without* removing them. However, for suitable parts there is considerable labor saving and the uniformity attained is a marked asset.

• • •



The part is shown on the spindle being lowered into the manufactured abrasive. Note the foam from the detergent.

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Replacement of Old Machine Increases Production of Tamper Bars

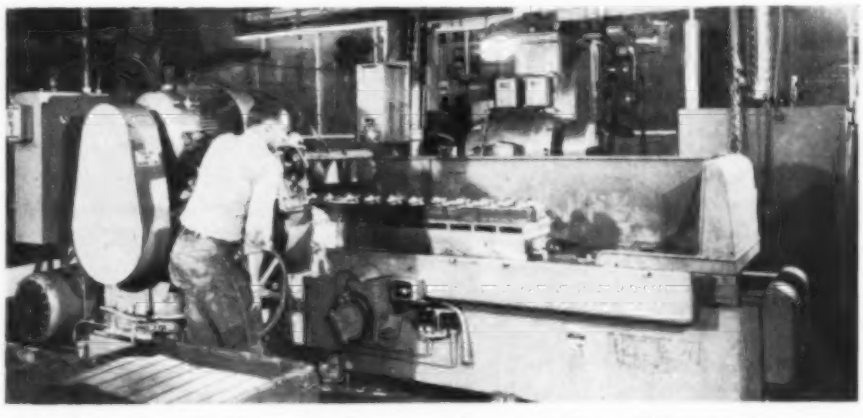
- ***26% faster overall grinding***
- ***Increased amount of abrasive contact***
- ***Accuracy demands more than satisfactorily met***

Typical tamper bar of the type mentioned in the text. The particular bar shown has its flats ground on a horizontal-spindle machine, while its edge and ends were ground on the face grinder. Photograph courtesy Mattison Machine Works, Rockford, Illinois.

The automatic road finishing machines are particularly interesting because they incorporate a tamping mechanism, which adds quality to the road mat. Tamping action kneads and compresses the material, interlocking aggregate particles in a way that cannot be accomplished by rolling alone. High-quality tamping bars constitute an integral part of the tamping mechanism; these bars must be precision ground, partly because of durability requirements; also due to performance demands.

The tamping bars must be ground to close tolerances, after which they are bolted and doweled to a tamper frame. The entire assembly is then fitted into the finishing machine. In operation, the tamper has vertical travel of only ⅜"; it moves at a speed of 1500 strokes per minute.

Tamper bars used in various sizes of Barber-Greene Aurora, Ill., road finishing machines have different lengths, 6, 12 and 15 inches. They are of alloy steel, heat treated, 54-57 Rockwell C.

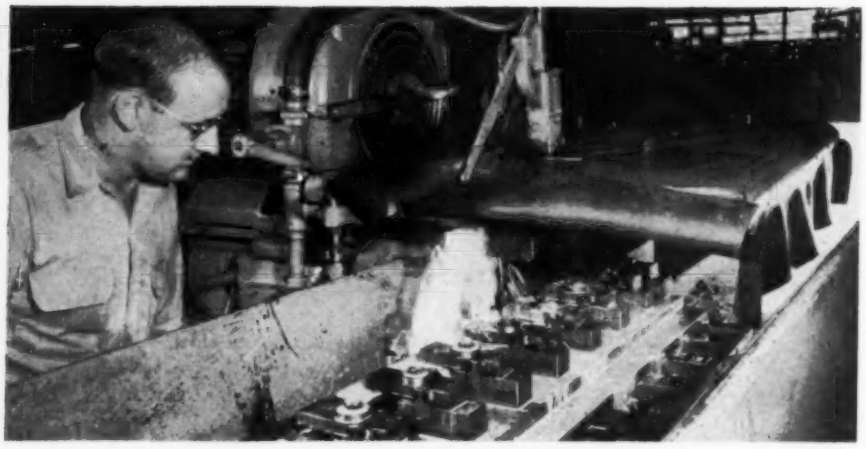


Operating view of face grinder at Barber-Greene Company, grinding edges on tamper bars. Note the bars are stacked three high on the fixture for grinding. Photograph courtesy Mattison Machine Works, Rockford, Illinois.

Comparative Results Obtained

Bars are surface ground on both flat sides, on one edge, and on both ends by a Mattison traveling-table face grinder, which carries a 24" chuck accommodating 12 abrasive segments. During the year the company has had this machine in operation, it has produced a 26% faster overall grinding operation than the horizontal-type surface grinder formerly employed.

Actual time study figures, compiled over a three-month period



Close-up view of face grinder from the rear, showing clamping equipment used on the fixture, and coolant flow to the segment wheel. Photograph courtesy Mattison Machine Works, Rockford, Illinois.

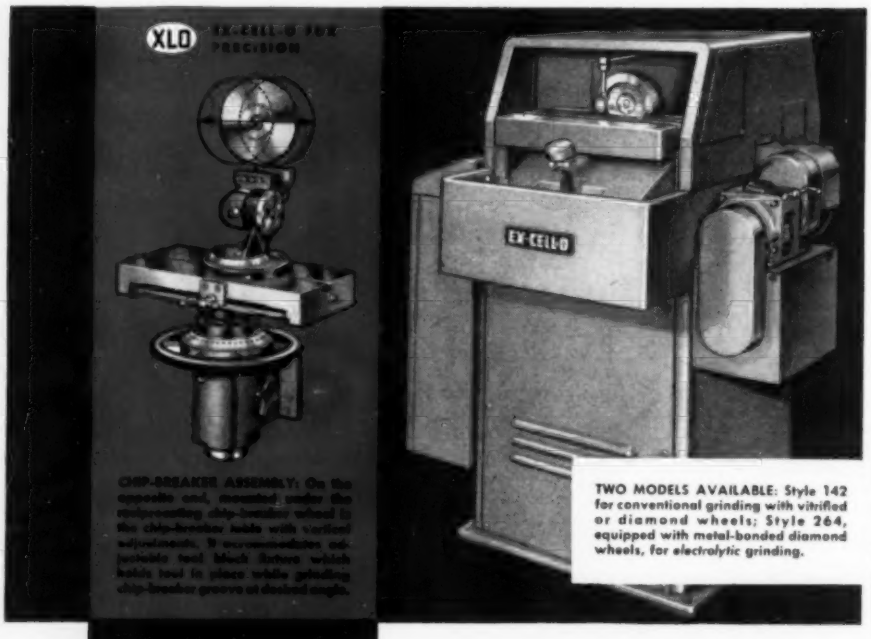
of daily observation, and broken down for each grinding phase, show following percentage increases over the replaced machine in grinding speed. On grinding both ends, the traveling-table face grinder is 19% faster; in grinding the one edge, it is 29% faster. It is found 30% faster in grinding the flat sides. These percentages translate themselves into a substantial increase in the number of pieces ground.

The old machine produced 148 pieces per 8-hour day, when grinding ends, whereas the replacement machine gives 182 pieces per day. In grinding the edge, the old machine ground 235 pieces per day, while the new machine produces 333. On flat sides, the former grinder turned out 56 pieces per day while the new one grinds 80. Much of this increase is because the horizontal-spindle grinder, using the periphery of the grinding wheel, had only line contact between the wheel and the bar; the segmented face wheel greatly increases the amount of abrasive contact with the work. The segmented wheel also allows much better coolant distribution; this in turn means faster grinding with less heat.

Why Rigid Tolerances Must Be Held

Close tolerances must be held in grinding the tamper bars; they must be ground within .005″ of flat to prevent asphalt from penetrating between them and the screed plate or the blade. The two surfaces must be in flush contact with the tamper bar when the finishing machine is in operation.

Accuracy demands have been more than satisfactorily met with this grinder; rejects are almost entirely eliminated. A cut of .0005″ or a brute cut of .0015″ can be fed, with assurance of getting a constant, exact cut through every grinding phase. A coolant filter is employed on this grinder. This equipment provides a positive advantage, removing all grinding dirt and grit from the coolant; preventing the wheel from glazing, and giving a better finished surface.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CHIP-BREAKER ASSEMBLY: On the opposite end, mounted under the reciprocating chip-breaker wheel is the chip-breaker table with vertical adjustments. It accommodates adjustable tool block fixture which holds tool in place while grinding chip-breaker groove at desired angle.
TWO MODELS AVAILABLE: Style 142 for conventional grinding with vitrified or diamond wheels; Style 264, equipped with metal-bonded diamond wheels, for electrolytic grinding.

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Now an entirely new reciprocating double end tool grinder designed by Ex-Cell-O to do two jobs in one—conventional grinding on one end, chip-breaker grinding on the other—has now been added to Ex-Cell-O's line of conventional, double end, carbide and Method X tool grinders. The difference is the adjustable, power-controlled reciprocation of grinding wheels. The operator need only hold the tool at the pre-set angle.

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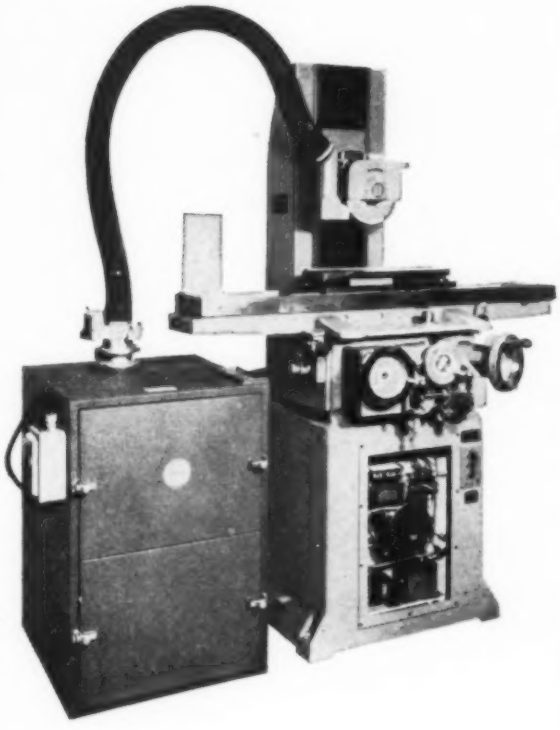
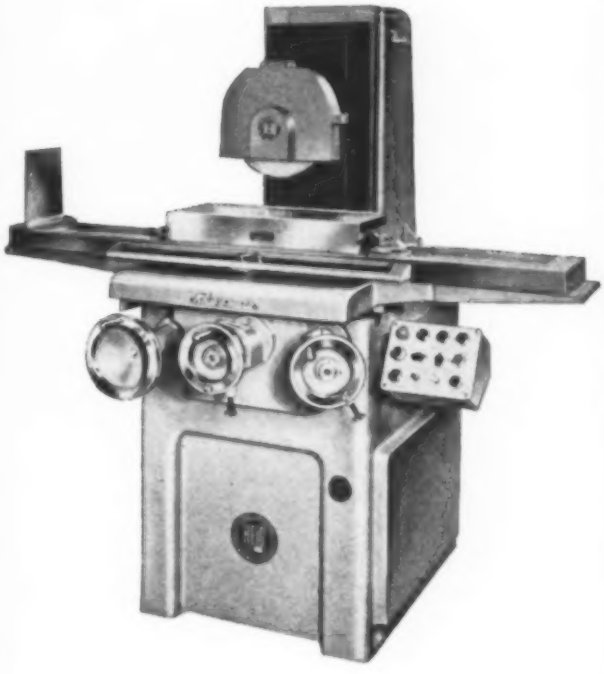


MODEL 618 P
with dust collector



REID-O-MATIC 824 . . .
fully automatic

Industry's number one choice . . . for toolroom and production economy!

The vast number of REID *precision* surface grinders, in all kinds of industry, is the best proof of their outstanding quality.

In the 618 class these different models are available; a 618 P with power operated table and cross feed — a 618 PT with power table and hand operated cross feed — and a completely manual grinder, the 618 H. Automatic lubrication and a Cross Slide Lock are included on REID grinders as standard equipment.

The REID-O-MATIC is a fully automatic, all electric, surface grinder with a capacity 8″ wide, 24″ long and 21″ from the table to the center of the spindle.

For your production and toolroom grinding, REID surface grinders offer the maximum in convenience, quality and economy.

Accessories can be furnished for wet grinding, cool grinding, dust collecting and other needs.

Complete specifications will be sent on request.

PRECISION SURFACE REID GRINDERS

Manufacturers of precision surface grinders for production and toolroom needs

REID PRECISION SURFACE GRINDERS

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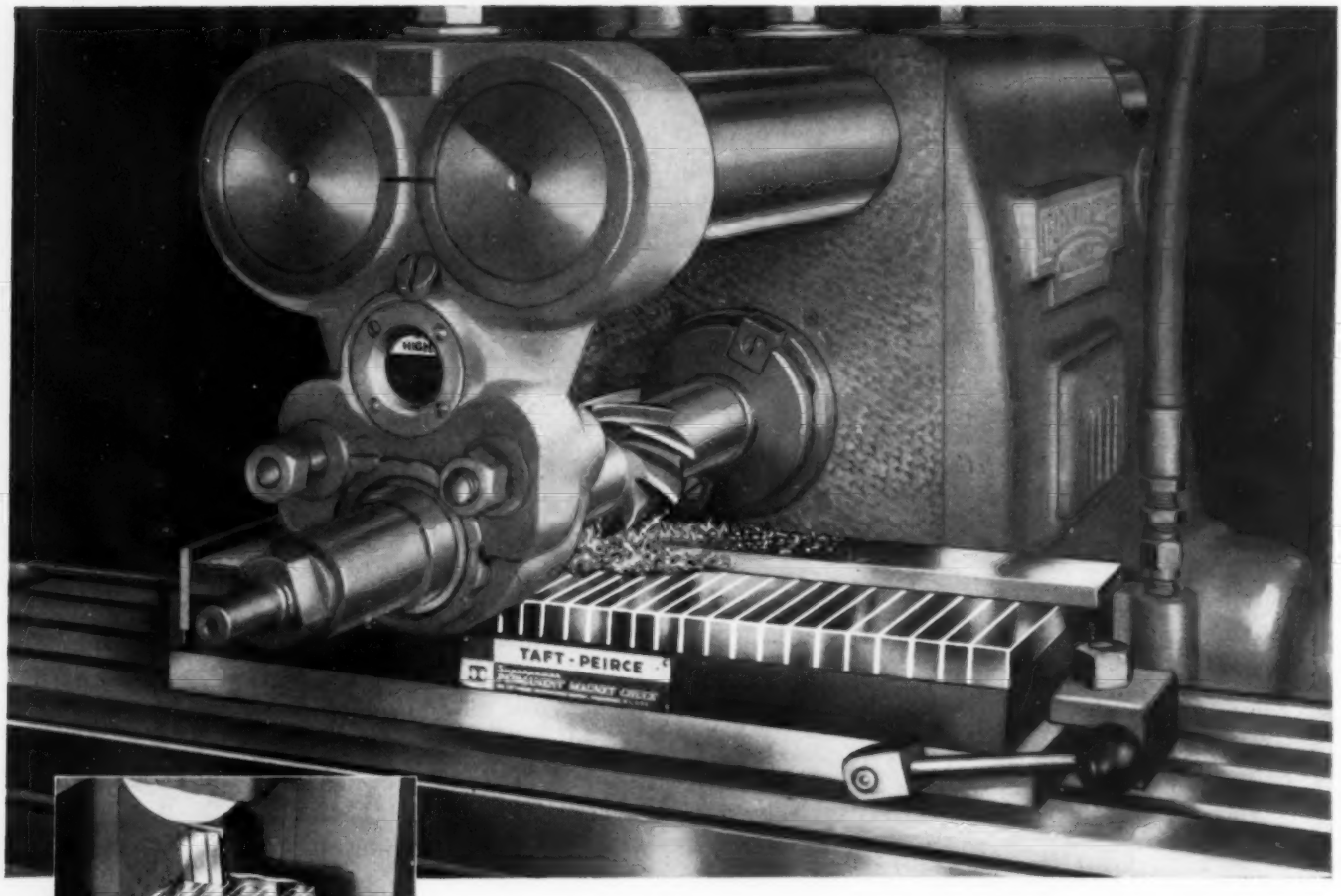
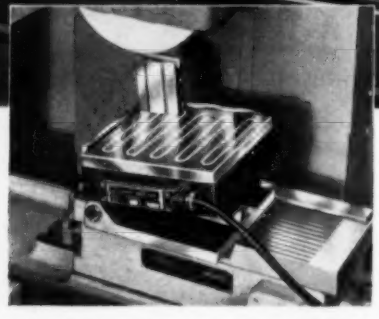
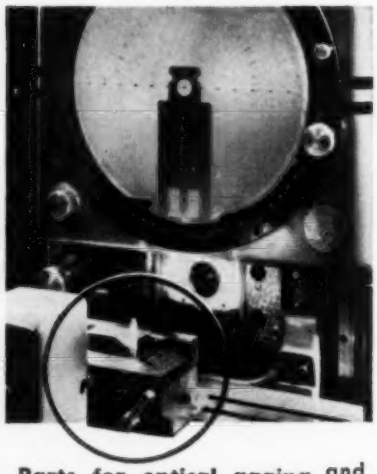




Simple angles can be quickly set up and precisely ground using Taft-Peirce Sine Angle Chuck. Compound sine angle type also available; and you can select either Permanent or Electromagnetic types.



Parts for optical gaging and other fussy inspection work can be positioned faster by holding on a Taft-Peirce Magnetic Chuck. Chuck accuracy assures precise positioning. Simple on-off lever or switch control provides faster work loading.

Magnetic Chucks Make Faster Setups on Millers, Shapers, Planers

This Taft-Peirce Permanent Magnet Chuck is being used on a Horizontal Milling Machine for fast, precise slab milling. It is one of the many adaptations alert production men use to bring new cost savings to setup, work handling, and machining operations.

Taft-Peirce Magnetic Chucks — both Electromagnetic and Permanent Magnet types — have rugged holding power for milling, shaping, and planing work. For heavy cuts, the chuck end stop counteracts the horizontal thrust of the cutter. Other places you can use Taft-Peirce Magnetic Chucks include: holding interchangeable die sets on punch presses, holding parts for hand snagging, and as holding fixtures for welding, due to the speed and ease of holding and release compared with mechanical clamping.

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Free Literature

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Optical Comparators

What optical comparators are, what they do, and various models are discussed in catalog 5700.

A versatile package, one said to measure over 85% of all surfaces produced by industry, is the Profilometer Group II. This equipment consists of the QA amplimeter, V mototrace, BK linkarm and LJ tracer. It was designed and developed with the operator in mind, and is lightweight, portable, and easy to use. The amplimeter has a direct reading microinch meter which does the computing for the operator, and gives the average roughness reading in either RMS or arithmetical units of measurement.

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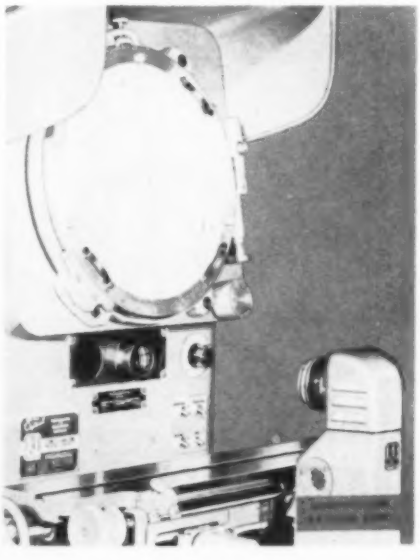

Science of Materials for Profits

Carborundum's third technical publication, "Advanced Materials Technology," is now available. It features information on materials designed to meet the problems of extreme heat, abrasive action, or corrosion in processing or operation.

Data is given on a self-bonded KT silicon carbide which claims to provide high strength and other outstanding properties up to 4000° F. Thermal shock problems are treated. An improved heating element is discussed, and some of the new uses of zirconium given. A question and answer treatment on ceramic to metal bonds is also featured.

Research and Development Div., The Carborundum Co., Niagara Falls, N.Y.

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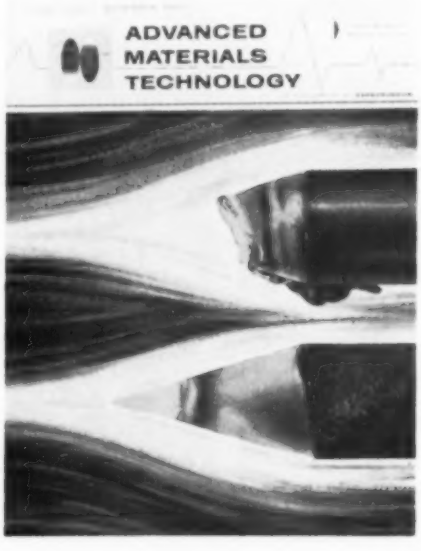

Vertical Chucking Grinders

Versatility for grinding, facing, or turning to precision tolerances of two and a half tenths of a thousandth, as determined with an electronic measuring instrument, is now available with a Bullard vertical chucking grinder, as claimed in a recent brochure. The nine different head combinations illustrated demonstrate the many-sided features of this machine.

A variable speed drive provides infinitely variable table speeds from creeping to top speed. Reversing controls permit grinding spindles to be run in either direction. Grinding spindle speeds can be furnished to meet customer requirements. For rigidity and accuracy grinding wheels are mounted on motor armature shaft.

The Bullard Co., Bridgeport 2, Conn.

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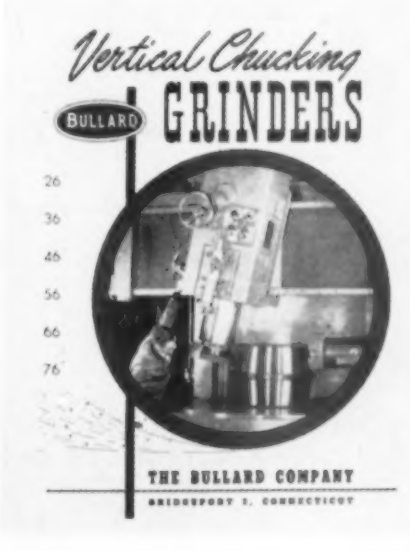

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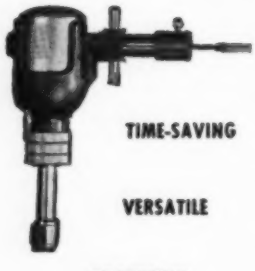

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the spiral point
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Cincinnati 9, Ohio
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Spiral Drill Points

The chief advantages of the new drill geometry are found in the spiral point which terminates at its center in a sharp point, and automatically centers itself on the axis of the drill when engaging the workpiece. There is no tendency to travel or walk to one side, according to information in the 16-page brochure. As a result, there is produced a rounder, straighter hole, truer to size; increased drill life; accuracy in hole positioning, among other advantages, it is claimed, for this spiral point concept in drill point geometry.

Cincinnati Lathe and Tool Co., 3207 Disney St., Cincinnati 9, Ohio.

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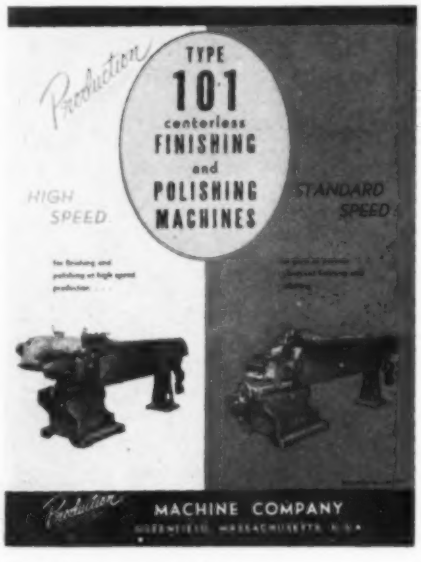


Finishing, Polishing and Buffing Machines

Bulletin from the Production Machine Co., Greenfield, Mass., describes the two machines for finishing, polishing and buffing by the centerless method on metal, fibre, rubber, plastics and other materials.

The standard speed machine is a versatile centerless machine with idler backstand for polishing and finishing with abrasive belts and contact wheels. Constant belt tension is maintained by weight and lever arrangement with all controls within easy reach of the operator.

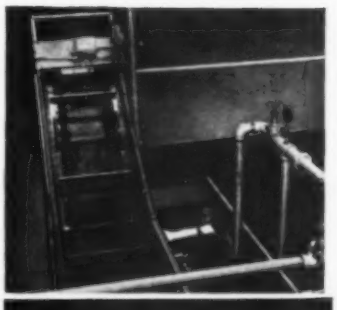
The high speed machine can be furnished in tandem installations of as many units as may be required to produce a given finish. Speeds of 100 or more lineal feet per minute can be attained with ease. Equipped with high speed feed units driven by separate one horsepower, vari-speed drives, they have adjustable roller fixtures used to guide the work between the machines to final finishing, polish or buffing operation.

Use postpaid card. Circle No. 5

Automatic Surface Grinders

Discussed in a four-page leaflet is the 16-A automatic grinder which grinds continuously with a wheel set and automatically maintained at a fixed height, and finishes one surface of the work to size in a single pass under the wheel. The operator has only to load the work on the magnetic

Fairfield Manufacturing*
*LAFAYETTE, INDIANA
Improves Gear Finish, Reduces Costs with the
Delpark Filter-Matic VACUUM FILTER



The heavy viscosity of cutting oils has always created problems where filtration was required on high flow rates. The fluidity of the oil itself often defeated the method, but on gear shaving production the metal fines borne in the spent oil added even greater difficulties.

Delpark's Filter-Matic Central System at Fairfield serves 10 Gear Shavers with a combined flow requirement of 30 g.p.m. To allow for future addition and expansion, a 60 g.p.m. Filter-Matic was installed.

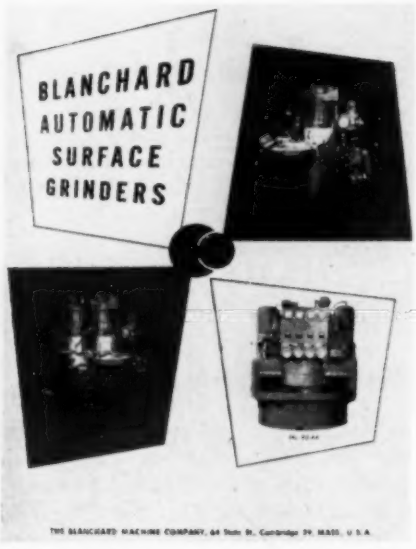
Fairfield has benefited several ways through the Delpark Filter. Gear finish has been improved, machine productivity has been increased and maintenance time reduced.

The Delpark Filter-Matic can save you time and money in filtering soluble and cutting oil on your machining operations. A Delpark representative can give you the complete story.

Delpark

—First in Filtration Advancement

INDUSTRIAL FILTRATION COMPANY
76 INDUSTRIAL AVENUE
LEBANON, INDIANA



chuck or into an automatic clamping fixture. Unloading is usually automatic.

The No. 16-A2 automatic grinder has two wheels, each with automatic size control. It roughs and finishes one surface of the work in a single pass through the machine. Used for the same class of work as the 16-A, it is also employed for larger pieces, where more stock must be removed than can be ground in one pass under a single wheel.

The Blanchard Machine Co., 64 State St., Cambridge 39, Mass.

Use postpaid card. Circle No. 6

Surface Grinding

"Developments in High-Powered Surface Grinding" is the title of Mattison's recent progress report. Discussed are how you can benefit from today's improved wheel bonds; significance of high-powered, precision surface grinding; and special effects on production, accuracy, finish, and work range of grinders.

Asserting that today's improved wheel bonds make grinding a versatile high-production method, the following advantages are claimed: Higher horsepower, backed by heavy, rigid machine construction, gives heavier stock removal. Greater total pressures permit larger contact area between work and wheel. Increased capacity permits operation without excessive wheel tilt for grinding accurate surfaces. Also, according to the pamphlet, rigid spindles, plus minimum wheel tilt, give improved accuracy and finer finish.

Mattison Machine Works, Rockford, Ill.

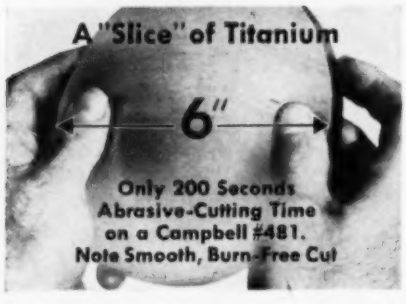
Use postpaid card. Circle No. 7

Campbell
Abrasive Cutting Machines

Abrasive Cutting Know-How

Know-How is just as vital to top performance in abrasive cutting as in any other machine tool operation

Cut Titanium... Any Tough Alloy... in Seconds per Square Inch with Campbell WET, Abrasive Cutting Machines



**Without Burn or Heat-Check
With Minimum Burr
With Accuracy & Fine Finish**

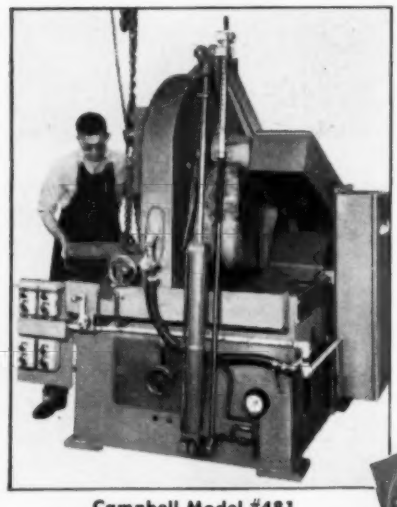
as pictured here... at cutting speeds of 6 to 10 seconds per square inch of High-Temperature Metals or Heat-Sensitive Tool Steels.

Real economy in costly material results from straight cut, closer tolerance, small kerf loss on CAMPBELL abrasive cutting machines. (1/32" less waste per cut on a 6" bar of titanium saves about $1.50 per cut!)

For highest production rates there are automatic CAMPBELL machines... semi-automatic or manual machines for short runs.

Quality cuts... no burn or heat-checks, minimum burr, smooth finish... (with *maximum wheel economy*), are assured by such CAMPBELL features as a flood of coolant precisely applied at cut... wheel oscillation... work clamps on both sides of cut... ample power.

Capacities range from the smallest stock to 14" rounds... billets up to 12" square... plate up to 6" thick and 20 feet long.



Campbell Model #481
wet, abrasive cutting machine. Capacity up to 8" square solids and 8" O.D. tubing.

May we send you a copy of Bulletin DH-460-B? It gives complete data on 15 Campbell Machine Models

ACCO

CAMPBELL MACHINE DIVISION • American Chain & Cable

926 Connecticut Avenue, Bridgeport 2, Connecticut

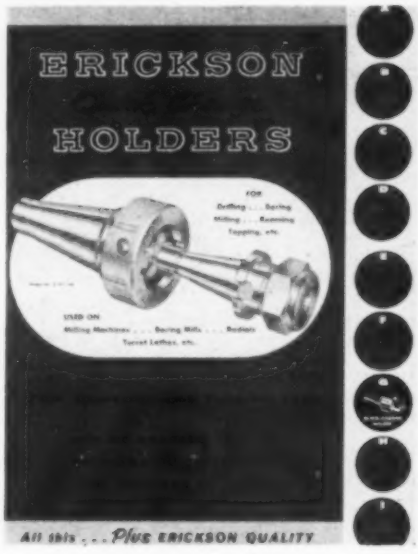
Electronic Test Indicator

Described in a four-page brochure are the electro-probe electronic test indicator, a portable dimensional test instrument, and Sure-Set, an electronic table positioning device for universal grinders. Specifications for both the Electro-Probe, a new approach to dimensional gaging, and the positioning

device are listed in tabular form. Examples of the gages, product photos, and a list of accessories are given.

Federal Products Corp., 1144 Eddy St., Providence 1, R.I.

Use postpaid card. Circle No. 8

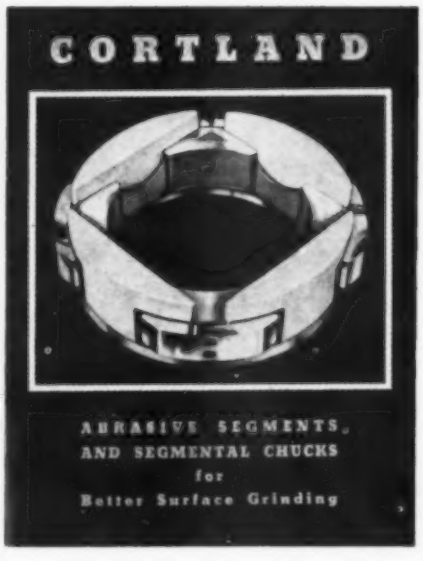


Quick Change Holders

An 8-page bulletin describes the Erickson quick change holders and how they can be used on milling machines, boring mills, radial drills, turret lathes, etc. The manufacturer states that standard MMS tapered tools can be adapted to the holders. Illustrated with photographs, exploded views, section and dimensional drawings.

Erickson Tool Co., 34350 Solon Rd., Solon, Ohio.

Use postpaid card. Circle No. 9



Abrasive Segments and Segmental Chucks

In a recently-published pamphlet put out by Cortland, combinations of abrasive, grain size, grade, structure and

HANDY NEW CALCULATOR ...AVAILABLE FREE!

This new calculator helps you mix grinding coolants and determine wheel speeds. It saves figuring and makes it easier to set up your machines. Get *your* calculator *free,* by filling out and mailing the coupon below.

WHAT IT DOES:

1. Shows at a glance how many pints, quarts or gallons of grinding concentrate to add to a certain tank for the mixing proportion you want. (For instance: Shows it will take 1¾ gallons to make a solution of "1 in 20" in a tank of 35-gallon capacity.)

2. Translates grinding wheel diameter and R.P.M. into surface speeds in feet per minute. (For instance: Shows surface speed is about 12,500 feet per minute for a 6-inch wheel, turning at 8,000 R.P.M.)

3. Explains the Standard Grinding Wheel Marking System (on the back.)

This tool will be of constant help to you in getting out work at the highest rate consistent with quality and safety!

W+B INDUSTRIAL LUBRICANTS

THE WHITE & BAGLEY CO.

Worcester, Massachusetts • Detroit, Michigan

Originators of Grinding Lubricants

Send Coupon Today!

THE WHITE & BAGLEY CO., 88 Foster St., Worcester, Mass.

Gentlemen: Please send me your Coolant-Mixing and Grinding-Wheel-Speed Calculator . . . at no obligation to me.

NAME ..... TITLE .....

COMPANY .....

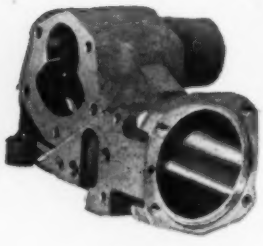
ADDRESS .....

CITY ..... STATE .....

Why MICROHONING

Is Final Stock Removal Process For Interrupted and Blind-End Bores

To secure low-cost, final stock removal, that generates accuracy and functional surface characteristics in a variety of bore conditions, a leading manufacturer of power steering assemblies uses Microhoning. Here are details concerning types of bores and stock removal results obtained by using Micromatic "Know How"—



STEERING GEAR HOUSING—Microhoning consistently corrects cumulative inaccuracies of preceding operations—reduces scrap—permits faster boring—cuts boring tool sharpenings—lowers down-time and tool costs.

Material: Soft Malleable Iron
Bore: 3.125"D x 6.93"L (Ported bore with ¼" relief at blind end)
Stock Removal: .002"
Finish: 50 Microinches RMS
Microhoning Cycle: 18 sec.
Preceding Operation: Boring

PISTON RACK—Microhoning answers the need for a final stock removal process that generates a controlled surface finish in the bore of this leaded steel part. Microhoned surface (cross hatch) prevents oil leakage and holds to a minimum the wear of seal that operates in the bore.

Material: Leaded Steel (Rockwell 62 "C")
Bore: .875"D x 3"L
Stock Removal: .005"
Finish: 20 Microinches RMS
Microhoning Cycle: 20 sec.
Preceding Operation: Boring and H.T.

VALVE HOUSING—Microhoning consistently holds size and geometric accuracy—meets stringent surface requirements—assures alignment of four lands in bore. Thus, there is no leakage of oil around control valve which is selectively fitted to its housing.

Material: Cast Iron
Bore: .770"D x 2.18"L (Interrupted)
Stock Removal: .0025"
Tolerances: Size .0005"
Roundness .0001"
Straightness .0001"
Finish: 10 Microinches RMS
Microhoning Cycle: 12 sec.
Preceding Operation: Boring

The principles and application of Microhoning are explained in a 30-minute, 16mm, sound movie, "Progress in Precision" . . . available at your request.

☐ Please send me "Progress in Precision" in time for showing on _____ (date).
☐ Please have a Micromatic Field Engineer call.
☐ Please send Microhoning literature and case histories.

NAME _____ G
TITLE _____ 1147
COMPANY _____
STREET _____
CITY _____ ZONE _____ STATE _____

MICROMATIC HONE CORP.
8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN

bond have been put together by engineers to produce the "true segment" shape that claims consistent performance.

This shape provides a grinding action that is said to promote unequalled high rate of stock removal and improved grinding finishes. The standardized, simplified chuck design promotes safety, speeds resetting or changing of segments, saves power, and reduces maintenance. The true segment shape acts to remove stock with a continuously varying area of contact between work and segment.

Also listed are chucks for various grinding machine applications, and abrasives and bonds for segments.

Cortland Grinding Wheels Corp., Chester, Mass.

Use postpaid card. Circle No. 10

OVER 80 YEARS OF DEPENDABILITY

DAYTON SAFETY

VITRIFIED AND RESINOID BONDED GRINDING WHEELS

PRODUCTS OF
SIMONDS WORDEN WHITE CO.
1101 NEGLEY PLACE · DAYTON 7, OHIO
ESTABLISHED IN 1873

Vitrified and Resinoid Grinding Wheels

Basic steps in the production and manufacture of vitrified and resinoid bonded grinding wheels are described in a 16-page bulletin. Standard grinding wheel markings, standard wheel shape specifications, and other engineering data are included. Featured is a detailed breakdown showing the abrasive, bond, and specification marking recommended for different types of metals, and classes of work to be ground.

Simonds Worden White Co., 1101 Negley Pl., Dayton 7, Ohio.

Use postpaid card. Circle No. 11

Face and Eye Protection

28-page brochure illustrates and explains such products as goggles, glasses, lenses, welding helmets, hand and face shields and respirators.

Write for catalog No. 35, Sellstrom Manufacturing Co., Palatine, Ill.

Use postpaid card. Circle No. 12

Snagging Wheels

Dayton safety snagging wheels, for removal of metal surface imperfections, are described in a four-page bulletin. Illustrations show applications on small castings and steel slabs, and the available range of standard wheel shapes. A specification table includes sizes and types and specification code markings.

Simonds Worden White Co., 1101 Negley Place, Dayton 7, Ohio.

Use postpaid card. Circle No. 13

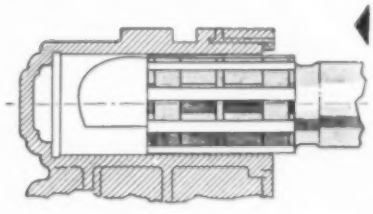
Precision Spindles

An 8-page pamphlet illustrates and describes Ex-Cell-O precision grinding and boring spindles. Many standard spindles for use as original equipment

How MICROHONING

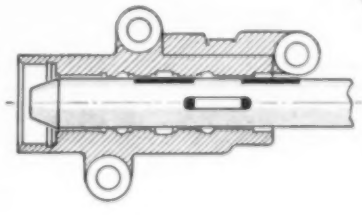
Cuts Costs—Generates Accuracy—Speeds Production of Interrupted, Blind-End Bores

Shown are two Microhoning machines that are used in the plant of a leading manufacturer of automotive power steering assemblies. Machines are equipped with automatic stone feed and stonewear compensating mechanisms, and automatic sizing controls. A two-position rotary fixture is interlocked with machine controls for fully automatic index cycle. The following applications tell more of the "how".



STEERING GEAR HOUSING—In Microhoning the ported, blind-end bore of steering gear housing a nine-stone tool is used. At least six of nine stones are in contact with bore surface when tool passes over irregularly shaped port. Removing .002" of stock from 3.125"D x 6.93"L bore in 18 seconds, Microhoning generates final accuracies and a controlled finish of 50 microinches as specified.

PISTON RACK—In 20 seconds, Microhoning removes .005" of stock from .875"D x 3"L open end leaded steel bore of piston rack. Self-sharpening abrasives assure a consistent generation of specified surface finish of 20 microinches.



VALVE HOUSING—Microhoning tool used for final stock removal in bore of valve housing has one bank of stones and two banks of plastic guides—three stones or guides in each bank. Guides act as tool pilots and stabilizers in interrupted bore—prevent overcutting at edges of lands—assure straight bore by keeping tool aligned. Self-dressing abrasives consistently generate geometric accuracy of .0001" and surface finish of 10 microinches.

Microhoning economically removes stock—corrects cumulative inaccuracies of preceding operations—reduces scrap—permits faster boring—lowers machine tool downtime and maintenance to cut costs and speed production.

Send Coupon for Complete Information

Learn how Microhoning will give efficient stock removal, closer tolerances, accurate alignment and functional surfaces.

☐ Please have a Micromatic Field Engineer call.
☐ Please send Micromatic literature and case histories.

NAME_____ G

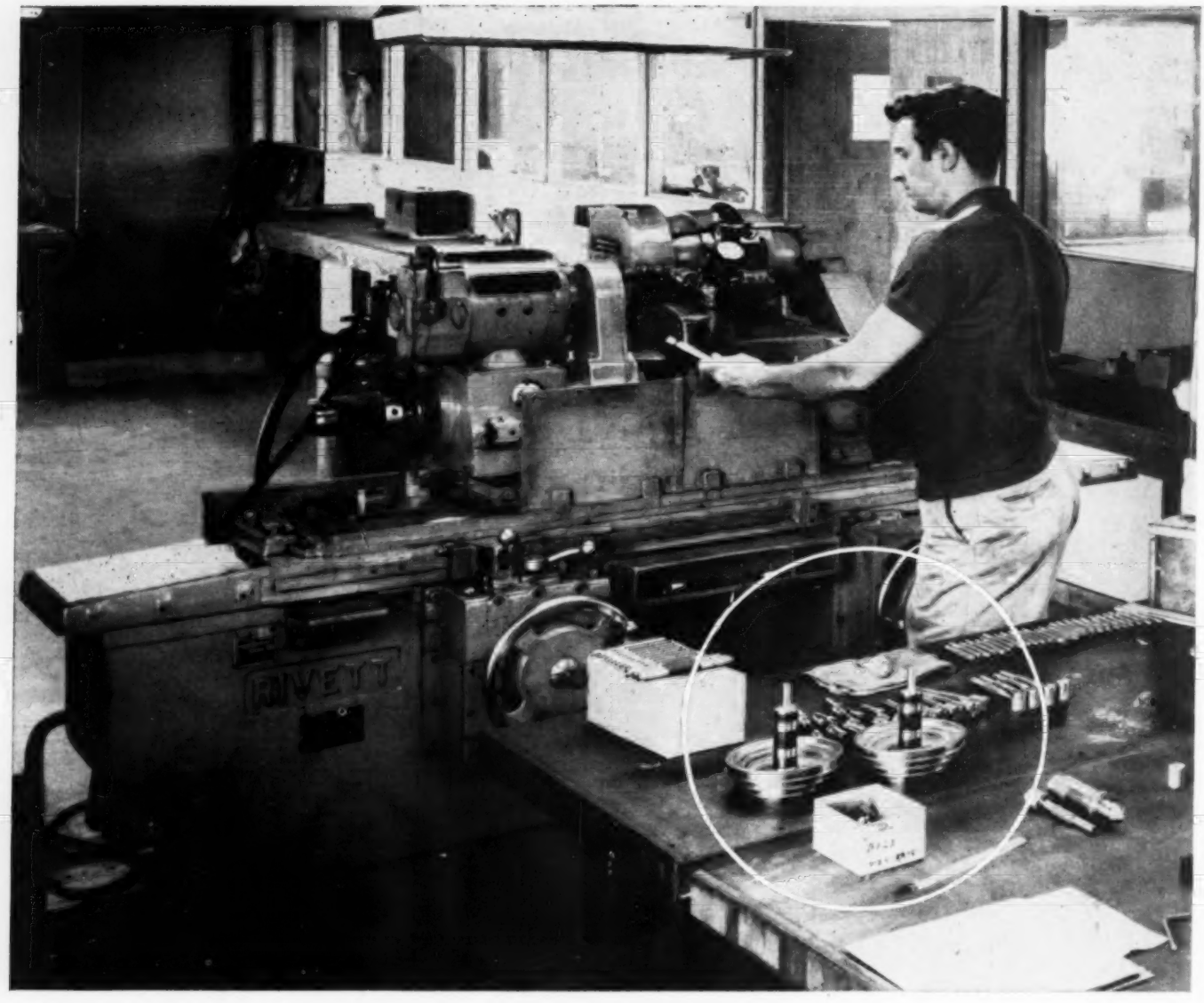
TITLE_____ 1148

COMPANY_____

STREET_____

CITY_____ ZONE_____ STATE_____

MICROMATIC HONE CORP.
8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN



Would your grinders have met these tolerances?

One ten-thousandths on diameter; 50 millionths total runout; 2 to 3 R. M. S. finish . . . tolerances that Peninsula Tool Co., San Carlos, Calif., *had* to hold on production runs for a well known manufacturer of ultra-sensitive tape recorders! After every grinding company on the West Coast had failed, Peninsula did it . . . because, as Peninsula Tool states, the job was put on *Rivett 1024 Grinders!*

Rivett 1024 Internal and Universal Grinder

You can keep this grinder always busy! Do any number of internal jobs and then switch over to external work. It has all the features of a true internal grinder extra-long table moves sufficiently to left to permit plug gauging to 6" depth without retracting wheelhead slide. Both spindles are flange mounted in massive wheelhead which swivels full 180° for quick conversion! Grinds any hole to 9" dia., externally to 12" dia.

Send for catalog 1024B and learn how this famous grinder does toolroom quality on a production basis . . . switches quickly from internal to external . . . really saving time and cutting costs!

RIVETT LATHE & GRINDER, INC.
Dept. GF 1 Brighton 35, Boston, Massachusetts

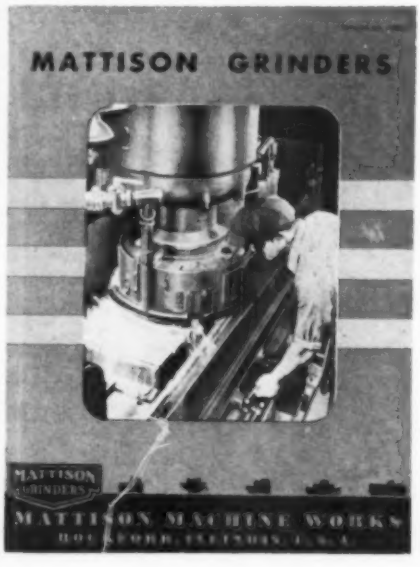
RIVETT
INTERNAL & UNIVERSAL GRINDERS

FREE LITERATURE *continued*

by machinery builders or as replacement spindles for grinders and boring machines are defined.

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

Use postpaid card. Circle No. 14



Surface, Face, and Disc Grinders

Catalog No. 1902RM features the Mattison line of grinders, numbering over fifty. From this varied selection, the engineers are able to recommend the type of grinder to give maximum accuracy, productivity, and economy for the customer.

Listed among the surface grinders is the vertical spindle-rotary type, for use in tool room work, die grinding, and general production and manufacturing operations. The traveling table

When shape and inaccessibility makes flat-surface machining of pump housings difficult...

Graymills Corp. cuts costs dramatically with an

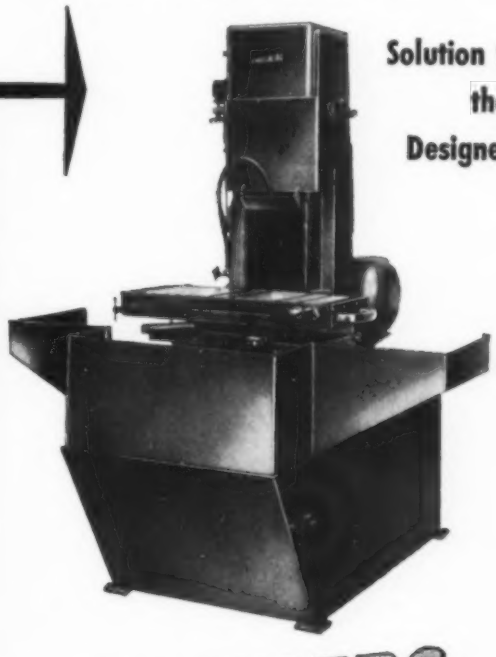
Engelberg Abrasive Belt Grinder

The shape of the intake-discharge housing on a Graymills immersion pump makes it unsuitable for surface milling or turning on a lathe. When either method is used, pump leakage results in as much as 10% of production runs, requiring corrective machining that pushes unit costs up.

Graymills installed an Engelberg platen type abrasive belt grinder, equipped with an automatic infeed table. To this machine (the BG8-FT9 described below) Graymills attached a draw-bar air fixture developed by their own engineers, designed to handle several sizes of castings with short run flexibility and minimum setup time.

Grinding rates on the grey metal pump castings are now considerably faster than alternative methods, in spite of a 1/32" stock removal. Very satisfactory belt life is obtained with 24-grit silicon carbide running at 5,000 s.f/m., cooled by a water-soluble chemical.

In the Graymills experience, Engelberg abrasive belt grinders again prove their adaptability to specific needs . . . adaptability that is limited only by the ingenuity of the engineers who program its use.



Solution to Graymills' Problem: the BG8A-FT9 Designed for Mass Production

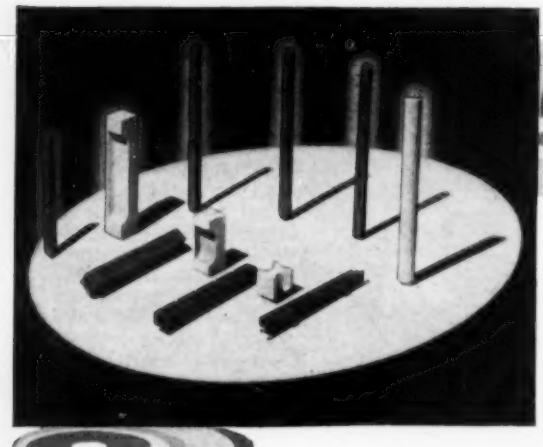
● Fast machining by wet or dry abrasive belt, backed by ground steel platen. Presetting controls rate of feed and pressure. Quick approach of ball-bearing table is followed by slower, hydraulically controlled infeed down to Micro-Stop limit. Does fine tool room jobs of surfacing, squaring, grinding angles, bevels, radii, etc.

For complete information on this and other Engelberg Abrasive Belt Grinders, write . . .

The ENGELBERG HULLER Co., Inc.
327 Seneca St., Syracuse, N. Y.

ENGELBERG
Precision **ABRASIVE BELT GRINDERS**

There is a difference



Regardless of your abrasive needs—coated abrasives, grinding wheels, honing stones, abrasive grain—Mid-West, with its modern facilities, vigorous research and development and trained abrasive engineers is your one sure source for complete satisfaction.

and progressive thinking makes the difference

MID-WEST QUALITY ABRASIVES

MID-WEST ABRASIVE CO.
510 S. Washington St., Owosso, Mich.

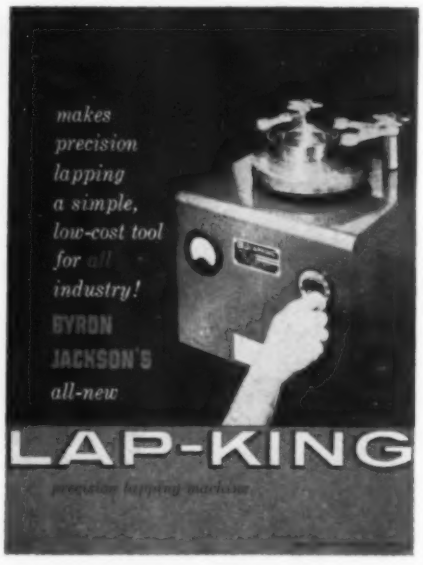
FREE LITERATURE *continued*

(hydraulic), a face grinder, is built for manufacturers of knives and shear blades, in paper mills, fire brick, terra cotta, and rubber plants. The single spindle disc grinder is used to grind one surface at a time and built in six different sizes.

Illustrations and complete specifications are given for all the grinders.

Mattison Machine Works, Rockford, Ill.

Use postpaid card. Circle No. 15



Precision Lapping Machine

The BJ Lap-King, as described in bulletin No. 57-1-1860, is designed to relap its own plates, one against the other, after a normal job run. This quality control is said to assure consistent optically-flat lapping plates for automatic accuracy of lapped work. Lapping accuracy to 11.6 millionths of an inch is claimed.

The machine is used for mechanical seal refacing for refineries, pipelines, power plants, and for repair work and small production runs where precision lapping is desirable.

Byron Jackson Pumps, Inc., P.O. Box 2017A, Terminal Annex, Los Angeles 54, Calif.

Use postpaid card. Circle No. 16

Face and Eye Protectors

Featuring the complete line of "Sellstrom Safeguards," face and eye protection equipment, a 28-page brochure illustrates and describes goggles, glasses, lenses, welding helmets, hand and face shields and respirators.

Sellstrom Manufacturing Co., Palatine, Ill.

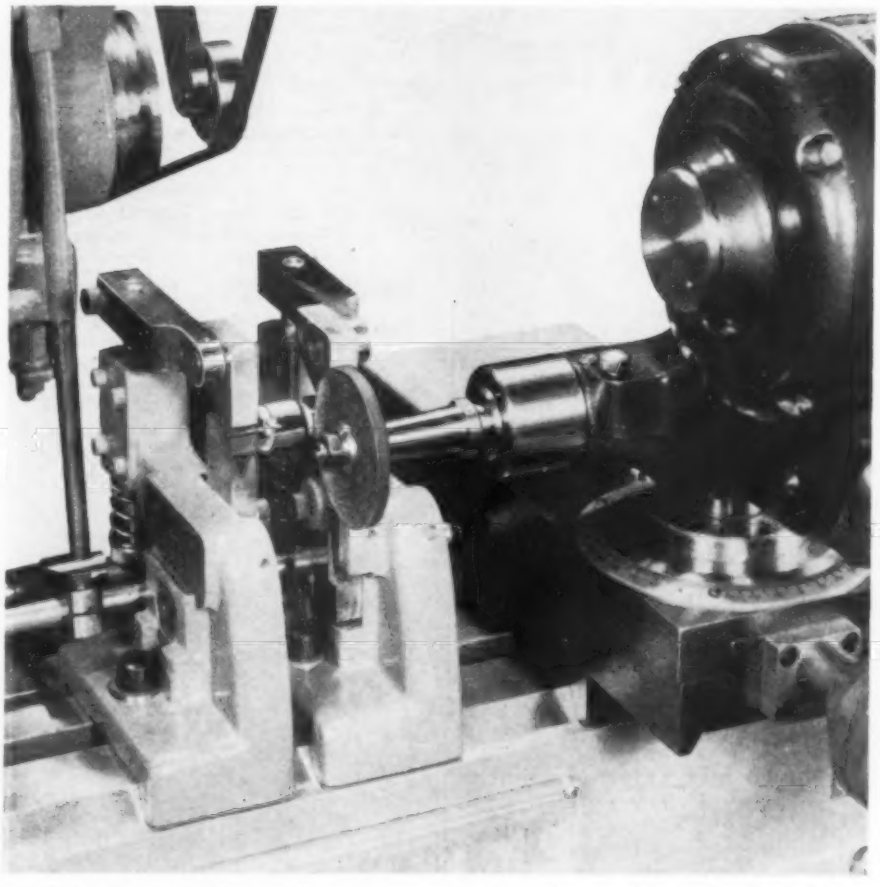
Use postpaid card. Circle No. 17

Grinding and Finishing

New Equipment and Materials

For further information on any of the products listed here, use the handy postpaid card opposite page 80.

Grinding Small Armature Work



A lathe for unusually small armature work features a Dumore grinding attachment for plunge-grinding the armature.

It is claimed that excellent concentricity between bearings and commutator is assured because the armature to be ground is held on its own bearings in carbide vee blocks. The arm and motor assembly is canted slightly so the drive belt thrusts the armature against the vee block, to properly locate work in relation to the grinding wheel. This method insures grinding between the flanges and prevents striking the flange shoulders. The grinding spindle is mounted on a slide rest base, and equipped with screw and dial for feeding into the work.

Rivett Lathe & Grinder, Inc., Brighton 35, Boston, Mass.

Use postpaid card. Circle No. 101

Reciprocating Tool Grinders

Two Ex-Cell-O off-hand tool grinder models, both of the double-end, reciprocating type, are the style 142 for conventional grinding with vitrified or diamond wheels, and style 264 equipped with metal-bonded diamond wheels for electrolytic grinding.

Designed to perform two jobs in one (conventional grinding at one end and chip-breaker grinding at the other), the grinder models feature adjustable, power-controlled reciprocation of the grinding wheels. A vertically-adjusted table, mounted beneath the reciprocating chip-breaker wheel, accommodates an adjustable tool block fixture

RECIPROCATING TOOL GRINDER—style 142 has vitrified or diamond wheels for conventional grinding, and style 264 is equipped with metal-bonded diamond wheels for electrolytic grinding.

CHIP BREAKER ASSEMBLY. Mounted under chip-breaker wheel is chip-breaker table with vertical adjustments.

which holds the tool in place while grinding the desired angle on the chip-breaker groove.

The grinders include variable stroke of 0 to 1½", and variable reciprocation of 0 to 220 strokes per minute. An in-built, motorized precision grinding spindle, saddle-mounted to reciprocate along hardened and ground bars is featured in each model.

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

Use postpaid card. Circle No. 102

Gear Honing Machine

The Model GHB Red Ring gear tooth honing machine has two methods for honing hardened gear teeth. For removing nicks and burrs and improving surface finish of hardened gears, there is a constant-pressure arrangement provided by the tilting table. The table is tilted down for loading by operating an air valve control. When the constant-pressure valve is actuated, the work is brought into tight-mesh

contact with the abrasive-impregnated, gear-shaped plastic honing tool.

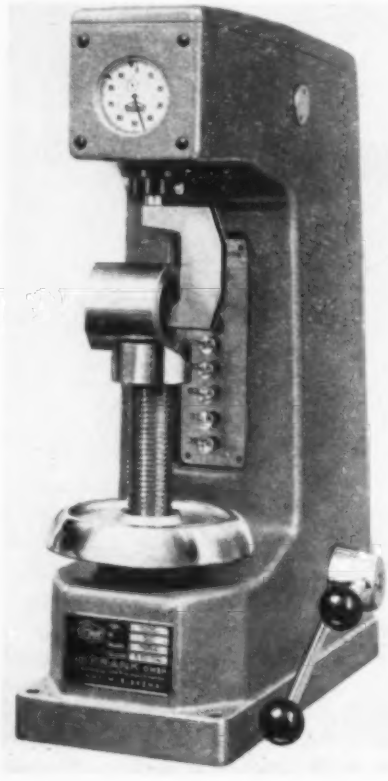
When more tooth shape correction is desired for hardened gears, the zero-backlash tilting table arrangement is the second method. With this design, the work is tilted into tight mesh under controlled loading conditions by an air cylinder and locked in that position by another locking air cylinder. The work is then honed in fixed center-distance relationship with the honing tool.

National Broach and Machine Co., 5600 St. Jean Ave., Detroit 13, Mich.

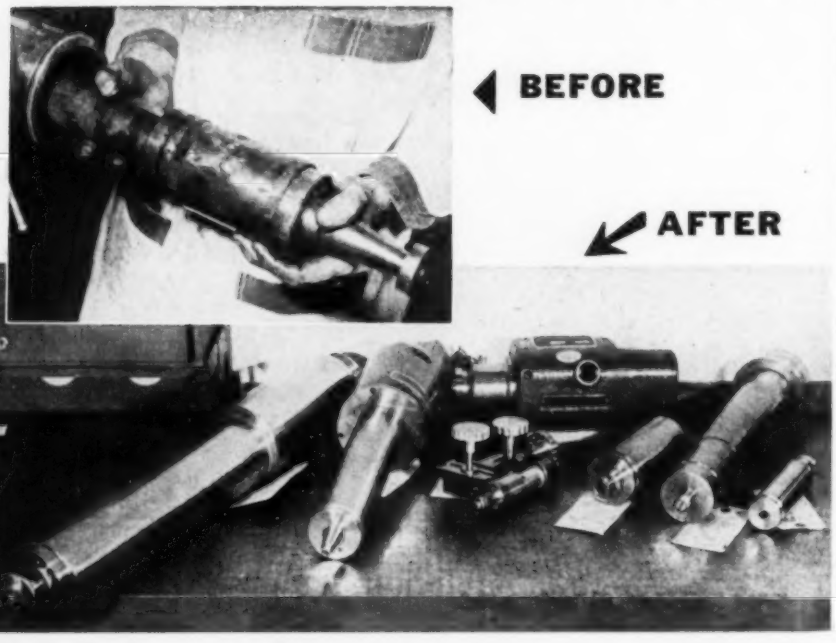
Use postpaid card. Circle No. 103

Hardness Tester Has Push-Button Control

A German-made hardness tester makes available eight different loads



BEARINGS, INC.
SPINDLE REPAIR SERVICE



All types and makes of High Speed Internal and External Grinder Spindles and Quills . . . Anti-Friction Live Centers . . . .

Restored to Original Accuracy in HOURS . . . Not Weeks!

Gentlemen:
I'd like to have complete information on your spindle repair service.

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Only

PRESTALLOY®

Oriented

DIAMOND DRESSERS

are

"Pressure-Set"

to

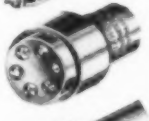
LAST LONGER...
CUT CLEANER

Regardless of your wheel dressing problem . . . you'll find PRESTALLOY tools cut cleaner and last longer . . . thanks to exclusive "Pressure-Set" processing! This advanced method of anchoring, permanently locks the diamonds in place at the correct operating angle . . . to insure maximum dressing speed and efficiency. Couple these field-proven advantages with the completeness of the PRESTALLOY line, and you'll know why there's a PRESTALLOY tool to meet your specific needs. Below are shown but a few of the many standard PRESTALLOY dressers immediately available.

SINGLE STONE DRESSERS for straight form and radius work.

IMPREGNATED DRESSERS for production grinding operations.

MULTI-DIAMOND for straight face and side dressing.



PROFILE DRESSERS for straight, form and profile use.

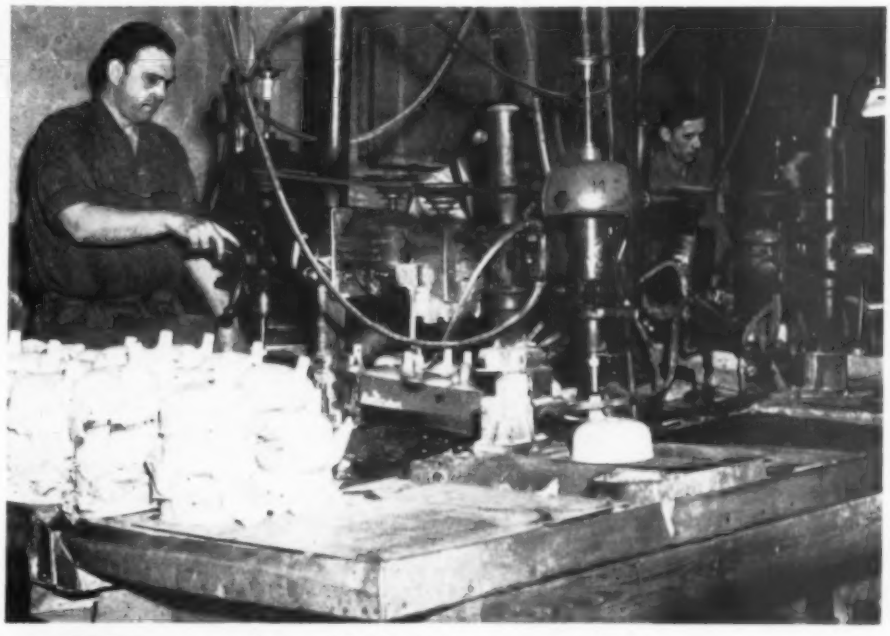
New illustrated PRESTALLOY catalog yours for the asking. Write today!

Fast delivery on non-standard dressing tools to your exact specifications. Send us your prints for quotation.

DIAMOND PRODUCTS, INC.
333 Prospect St • Elyria, Ohio
Dealerships available in some areas

LOOK HOW
HOFFMAN DIAMOND BITS
CUT PRODUCTION TIME

Used for drilling spout, center hole and taper in juicer bowls—Hoffman Bits more than doubled previous output.



Thin Wall Diamond Bits
ORIENTED SURFACE SET OR IMPREGNATED

. . . They produce laboratory results under the toughest production conditions

Hoffman Thin Wall Bits save time and money because each bit is engineered for the specific application—they're not just stock bits. Here are precision drilling instruments that not only cut faster—they last longer too.

Actual production figures show that Hoffman Bits are helping many producers to revolutionize entire manufacturing techniques. Practical, economical, tough—Hoffman Thin Wall Bits assure you of the highest production per bit available anywhere—for precision drilling of glass, ceramics, quartz, etc.

Write today for illustrated literature—FREE
Ask about Bit designs for your application.

HOFFMAN BROS. DRILLING CO.

102 CEDAR STREET **PUNXSUTAWNEY, PENNA.**

Drilling Experts Since 1902

by push-button control. In this way a choice of the following tests can be made: Rockwell C by "Brale" penetrator; Rockwell B by 1/16" steel ball; Brinell by 2.5, 5 and 10 mm steel balls, and Vickers by 136° diamond penetrator.

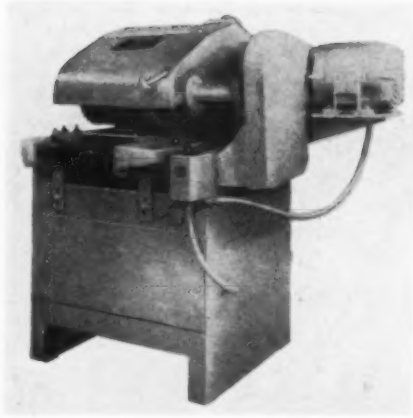
The machine is of heavy streamlined design with fully-enclosed operating parts. The dial gage provides automatic zeroing for the minor load. An oil brake regulates the load speed, and two co-axial ball handles insure maximum operating speed and comfort.

Opto-Metric Tools, Inc., 137 Varick St., New York 13, N.Y.

Use postpaid card. Circle No. 104

Abrasive Machine

Timesaver Speedbelt 12 is an abrasive belt machine that can be used on many finishing, sanding, and polishing operations now being done by hand. Its compact design, size, and 34" feeding height enable use in production lines where small metal parts are fed



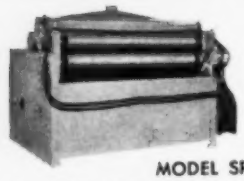
by conveyor directly to the Speedbelt 12. Used in tandem, deburring and polishing can be done by sequence by utilizing two different grit sizes of abrasive belts.

This machine is available with three types of feed tables. Positive feed adjustment can be made for material up to 2" thick. For jobs requiring a wider belt, there is a Speedbelt 18 model.

Timesaver Sanders, P.O. Box 7446, Robbinsdale Station, Minneapolis 22, Minn.

Use postpaid card. Circle No. 105

TIMESAVER SPEEDBELT* ABRASIVE MACHINES



MODEL SPL
24", 36" & 50" belt widths

MODEL TOP
24", 36", 50" & 54" belt widths

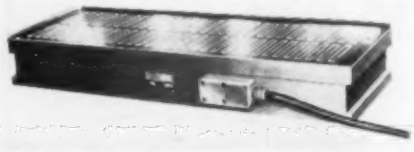
Both Models of the Timesaver "Speedbelt" Abrasive Machine can be used in tandem for automatic polishing of tops and bottoms of material being processed . . . in one operation.

Mechanize polishing of aluminum, stainless steel and other metal sheets, bars and blanks —perforated or solid

TIMESAVER *SPEEDBELT* Abrasive Machines are the fastest and easiest machines to set-up for production polishing schedules on the market today. Abrasive belts with grit range from 40 to 220 can be changed in 5 minutes or less. Adjustment for stock thickness can be made in seconds. Feed speed is variable from 35 to 80 SFM with lower or higher speeds optional In addition to polishing, Timesaver Machines are used for metal finishing and deburring operations.

Write Today . . . send for the on-the-job story of Timesaver Machines polishing metal grilles and folder describing in detail all the Timesaver features, construction and specifications.

TIMESAVER SANDERS
P.O. BOX 7446 • ROBBINSDALE STATION
MINNEAPOLIS 22, MINNESOTA



Magnetic Chuck

A fine-grid magnetic chuck has precision-meshed magnetic poles. The resulting magnetic pull holds even small parts firmly in place while being machined. The magnetic poles are ⅜" steel separated by ⅛" non-magnetic separators of CRP242 hard Epoxy resin or Magna-Lock special soft metal.

Magna-Lock chucks are available in all sizes. They can be installed in tandem mounting or end to end to make up larger machine table surfaces.

Hanchett Magna-Lock Corp., 568 Maple St., Big Rapids, Mich.

Use postpaid card. Circle No. 106

Barrel Finishing Equipment Has Safety Doors

A multi-use barrel, in sizes ranging up to 120" I.D., has been added to the Speed-D-Burr line to provide one piece of equipment capable of doing many jobs of barrel finishing and deburring.

For large loads the equipment may be used as a single cavity barrel; by simply inserting an optional compartment-type container into the main barrel, it provides six or more separate

Fig. 1
BARREL CLOSED

Fig. 2
BARREL OPEN

divisions, each capable of holding a different job; or, by placing in the single cavity a custom-designed holding fixture, it finishes parts up to 118" long.

The entire top three-panel section may be easily removed (Fig. 2) for placement or removal of large workpieces or holding fixtures. Inspection doors offer complete accessibility to all compartments. These inspection ports are self-contained, hinged to the barrel, and have positive action locks to hold the door closed against an O-ring moisture barrier.

The feature of hinged, non-hazardous doors is a safety factor. It is impossible for the operator to ever drop a door, causing injury to personnel and equipment, it is claimed.

Speed-D-Burr Corp., 3613 San Fernando Rd., Glendale 3, Calif.

Use postpaid card. Circle No. 107

MAGNETIZERS FOR PERMANENT MAGNETS, MF-200 and MF-300, are mobile plug-in units. For comfortable operating temperatures, the coils are wound directly on the steel structure over only a film of Mylar insulation. The leads are terminated at the coil surface for plug-in connection. Magnetic Materials Section, General Electric Co., Edmore, Mich.

Use postpaid card. Circle No. 108

Die Transfer Table Can Move 2,500 Lbs.

Big Beulah is the catchy name given to the new die handling table which has been added to the line of Portelvators (portable elevating tables). She rolls and turns, lifts and lowers, pushes and pulls. The transfer table lifts load up to 2,500 lbs. and transports them to another surface without manual strain or risk of damage to either load or man.

Big Beulah is ideally suited to the work of transporting dies from storage to press, but may be used also for everyday lifting, moving, and maintenance work around shops, stores, mines, quarries, warehouses, and transport companies.

Reinforced top-plate has an area of 748 square inches (22" x 34") and is fitted with eight recessed, free rolling conveyor rollers for ease in moving loads. A ram, impelled by a screw-and-nut device, travels the length of the top plate, pushing loads from table to press or storage shelf, and pulling loads from press or storage shelf to table.

For standard Portelvators there is now a top-plate similar to that used on

D1-S Grinder on radial drill grinding hard spot on bearing seat.

here's the way to cut costs in hole grinding

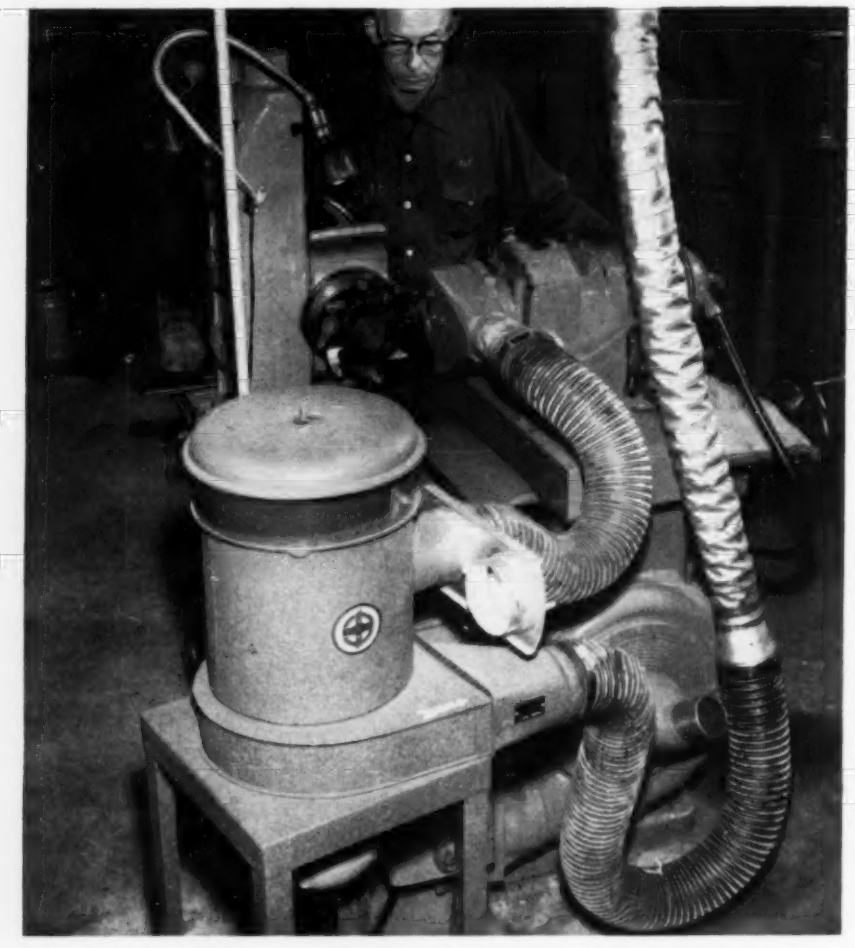
...even when needed only a few times per year!

With the Onsrud D1-S Hole Grinder you can do precision grinding in your own shop. Designed for mounting on lathe, milling machine, jig borer or drill. Air turbine motor drive gives ¼ HP, 50,000 RPM grinding speed. A precision built unit throughout with vernier scale for adjustment to 0.0001". For grinding holes up to 2¾" diameter . . . or up to 4" with adapter plate. With the D1-S you can do precision hole grinding in your own shop . . . and control quality to your own standards at considerably lower cost. Experience shows it pays for itself, even when used only a few times a year. For complete information write for Bulletin 1126.

ONSRUD
MACHINE WORKS, INC.
PORTABLE TOOL DIVISION
3945 Palmer Street • Chicago 47, Illinois

Onsrud®
D1-S
HOLE GRINDER

"...expect our Torit Diamond Dust Collectors will pay for themselves every 3 to 4 months!"



Goddard & Goddard Co., manufacturer of milling cutters

Goddard and Goddard Co. is only one of many firms who have *first* tested—*then bought* Torit's revolutionary new Diamond Dust Collector with its exclusive *centrifugal* separating device. One large automotive manufacturer saved up to *30%* of the carats originally contained in their diamond grinding wheels. You can do the same on *mist*, *wick*, or *dry* grinding.

By eliminating filters, Torit was able to achieve extreme compactness (65 lbs. . . . 14″ x 22″ floor space). And as Goddard and Goddard says, "Engineering-wise, the *simplicity* of design makes the Torit Diamond Dust Collector more trouble-free than any other piece of equipment in our plant."

This simplicity drops the price of a Torit Diamond Dust Collector *down below* the cost of a single diamond wheel! It's no wonder that Goddard and Goddard Co. states, "We look forward to installing *more* of the Torit units." High performance, low cost, and compact design makes the revolutionary new Torit Diamond Dust Collector a *must* wherever there are diamond grinding wheels. For further information write . . .

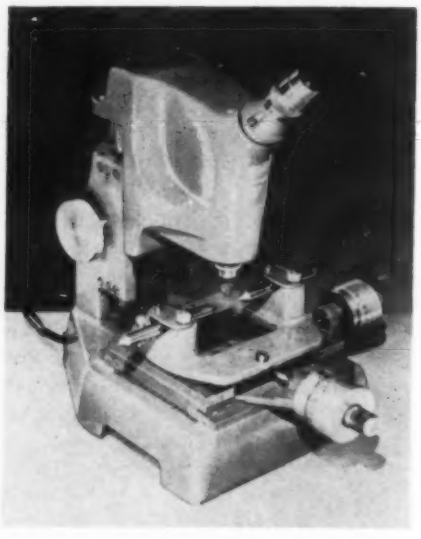
TORIT MANUFACTURING COMPANY
Dept. 509, Walnut & Exchange St., St. Paul 2, Minn.

NEW EQUIPMENT *continued*

Big Beulah, incorporating a traveling, screw-and-nut impelled ram and recessed conveyor rollers.

The Hamilton Tool Co., Ninth St. at Hanover, Hamilton, Ohio.

Use postpaid card. Circle No. 100



Toolmakers' Microscope

Ruggedly constructed, the 23 lb. toolmakers' microscope is a combination of optical and mechanical precision, necessary for consistent accuracy. It is designed for the inspection and measurement of drills, taps, jigs, templates, milling cutters, reamers, and small work parts.

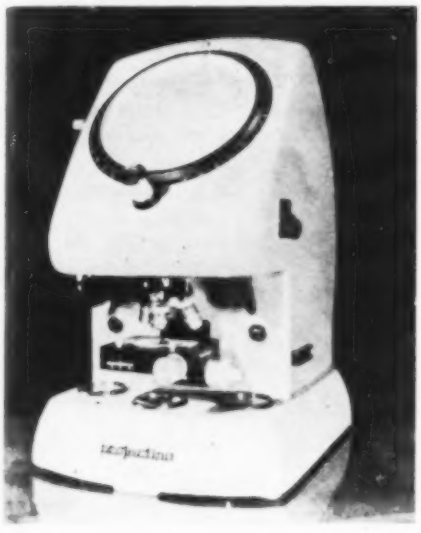
The total range of magnification with interchangeable eyepiece and objective lenses is 27X to 360X. Standard lenses supplied give a magnification of 35X. Working distance is 4″, permitting focus on parts or tools up to 2½″ in depth. A vertical illuminating system

eliminates accuracy-destroying shadows. Measurement is possible in two directions, controlled by micrometer spindles reading directly to .0001".

Optional accessories include an interchangeable protractor eyepiece which permits accurate measurement of angles. Special eyepiece scales can be made to customer specifications.

The DoAll Co., Des Plaines, Ill.

Use postpaid card. Circle No. 110



Optical Multi-Purpose Testing Instrument

Projectina is the name of a Swiss perfected optical precision unit which combines into a portable, stream-lined housing—microsope, projector, comparator, camera. Created for economical inspection methods in research and quality control, the accent is on the rapid inter-change of choice optics and photographic equipment.

By fitting a simple adapter to the observation face of the instrument, any image previously projected on the screen in the magnification range 7x to 2000x may instantly be photo-recorded with either the Graflok Back or Polaroid Land Back in black and white or color. Micro pictures may be seen on an effective 7" ground glass screen and also through the eye piece, at a constant scale, without refocusing. Powerful built-in illuminators allow for easy miscroscopy and projection in transmitted bright and dark-field as well as surface bright and dark-field. The light intensity is variable by finger-tip control.

The total range of vertical adjustment is comprehensive enough to permit comparatively thick specimens as well as appropriate fixtures or accessories to be mounted on the stage. For continuous observation without strain, the location and slight inclination of the screen have been carefully chosen, so that it will be on a natural level of vision with the operator in sitting position.

Standard screens are offered in a choice of eight variations—from plain to vernier or angular reference lines. All screens interchange readily and always maintain exact magnification.

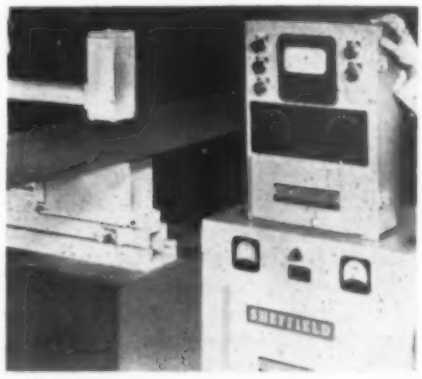
Alfred Hofman & Co., 629-635—59th St., West New York, N. J.

Use postpaid card. Circle No. 111

X-Ray Gage

Low-intensity X-rays in split-second pulses scan film and foil speeding by at 100 feet per second, and measure strips .0002 of an inch thick with accuracy of millionths of an inch in a new type gage, it is claimed by the manufacturer.

By using pulses instead of continuous radiation, Sheffield's Measuray

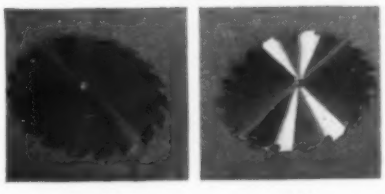


FOR HEINEMANN SAWS—

how HEINEMANN does it!

Saw blades are taken rough ground from surface grinders. They are placed on the magnetic rotating plate. The Brightboy Wheel oscillates back and forth across the surface of the saw.

"a mirror-like BRIGHTBOY Finish, unobtainable by any other form of polishing"



BEFORE AFTER

Heinemann Saw before and after Brightboy polish.

The FINISHING Touch!

"The eye-appeal provided by Brightboy's unique working action plays an important part in selling our saws", says Mr. William Heinemann of nationally-known Heinemann Saw Corporation, Canton, Ohio. "It produces the superb finish which reflects the high skill of our craftsmen and our use of finest materials."

FOR MANUFACTURE & MAINTENANCE OF MANY TYPES OF TOOLS

A Single-Step BURRING, FINISHING, CLEANING, POLISHING OPERATION

Brightboy's ABRASIVE & RUBBER work simultaneously to achieve this 4-in-1 operation. Stock Brightboy numbers are match-mated to the tool and steel for any requirement of finishing. A Brightboy finish frequently constitutes the final polish.

Readily Available: A WIDE RANGE OF STOCK BRIGHTBOY SHAPES, SIZES & TEXTURES

Wheels, sticks, rods and blocks for machine and manual operations come in Silicon Carbide and Aluminum Oxide grains from extra fine to extra coarse. Soft, firm, and tough rubber binders.

Practically limitless applications bring an entirely new, wider concept of abrasive uses. Ask your dealer for Brightboy's catalog listing grains, textures, applications, machine speeds. Write us if he cannot supply you or on any problem in which finishing is involved.

WELDON ROBERTS Brightboy RUBBER CUSHIONED ABRASIVES

BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.
95 North 13th Street Newark 7, N.J.
America's Pioneer Manufacturer of Rubber-Bonded Abrasives

gage pinpoints changes of thickness even at extremely high speeds of strip production. At 600 pulses per second the gage provides an individual thickness reading every third of an inch on foil fed through at 1,000 feet per minute.

The gage measures material as plastic film, foils made of steel, aluminum, copper or brass, as well as sheet and bar stock. It will take up to 36,000 readings per minute on strips of these materials.

The Sheffield Corp., Dayton, Ohio.

Use postpaid card. Circle No. 112

Fluorescent Penetrant Inspection Kit

The Zyglo ZA-43, all in push-button, pressurized spray cans, is available for locating cracks, pores, leaks, and other defects open to the surface in any solid material.

In testing, the pentrant is sprayed on the part to be tested, and time allowed

for capillary action to draw the penetrant into any crack or porosity. Cleaner then removes penetrant from the surface.

Included in the kit's case are: pressurized spray cans of cleaner, penetrant, and developer; a 100 watt high intensity black light; cleaning cloths; wire brush, and instructions.

Magnaflux Corp., 7300 W. Lawrence Ave., Chicago 31, Ill.

Use postpaid card. Circle No. 113

accent on Accuracy!

Whitnon Boring Spindles

The efficiency of a Sextant depends on accuracy of manufacture

The accuracy of these spindles accents Whitnon's ability to provide precision spindle performance . . . for longer tool life and increased production.

Whitnon Spindles are engineered for rigidity and machined to super-close tolerances . . . incorporating extra-capacity bearings and large alloy-hardened shafts to eliminate radial and axial deflection. Spring pre-loaded . . . grease lubricated . . . sealed for life . . . and dynamically balanced after assembly.

Designed and built by spindle specialists in one of the best equipped plants in the industry.

WRITE FOR LITERATURE TODAY.

THE Whitnon MANUFACTURING COMPANY
ROUTE 6 AND NEW BRITAIN AVE., FARMINGTON, CONNECTICUT

Preforms for Joining Dissimilar Metals

Epoxweld 100, a single component Epoxy preform used in automatic or production joining of metals, plastics, ceramics, glasses, and quartz, is now available. It is an unpolymerized epoxide resin in preforms (pressed shapes), allowing fabricators to present a definite shape and amount of epoxy bonding material for a production assembly. The preform is pre-positioned, the assembly brought up to temperature and cured. The preform can be indexed automatically.

The advantage of this preform for bonding, it is clamied, is the low melting point 248 degrees F., and quick cure cycle, 536 degrees F. in three minutes, permitting rapid assembly with no elaborate heating equipment. The joints are corrosion-resistant, gas tight, and waterproof; and the preform has ability to tailor the flow and wetting characteristics to meet a special job requirement, according to the announcement.

The preforms are available in a variety of pellets, plugs, discs, rings, and multi-hole shapes from 1/16″ dia. to 4″ OD.

Duramic Products Div., Technion Design & Mfg. Co., Inc., 262-73 Mott St., New York 12, N.Y.

Use postpaid card. Circle No. 114

Abrasive Wheel Cutting-Off Machine

The Barson machine features a special drive gear for continuous speed regulation. It works with a speed of 20,000

ft. per min. for a clean and perfectly square cut, it is claimed.

The cutting wheels are almost unbreakable and give trouble-free service, according to the announcement. The wheels can be worn down to the flange.

The machine can be used on steel, aluminum, bronze, copper, cast iron, brake linings, synthetic fibers, resinoid, also all plastics. Miter cuts can be made by means of a special vise.

The driving motor and gear mechanism for the continuous regulation are placed inside a sturdily constructed cabinet. The headstock adjustment is carried out by means of the handwheel. The cutting wheel, enclosed in a heavy cast iron hood, is rapidly returned after cutting by means of a withdrawal spring. An adjustable stop is supplied with the machine for cutting exact length with great facility.

Wandsbeker Werkzeug-Gesellschaft Beinhoff & Co., Hamburg-Wandsbek, Konigsreihe 3, Germany.

Use postpaid card. Circle No. 123

Finishing Paper

Armour No Load finishing paper will not fill or clog during sanding, it is claimed, and is ideal for use with undercoats, paints, varnishes, lacquers, enamels, shellac, sealers, primers, and surfacers.

The finishing paper features a tough flexible backing which prevents slipping in the operator's hands. A binder adhesive prevents grain shedding when sanding sharp or rough edges, according to the announcement.

Armour and Co., Coated Abrasives Div., Alliance, Ohio.

Use postpaid card. Circle No. 115

Large Screen Optical Comparator

A comparator known as the Big Twin Eighteen Model offers both a large 18" diameter image screen, as well as duplex operational features. The duplex design permits this comparator to be used either as a vertical (floor-type) model or in a horizontal (bench-type) position. The optical system gives bright images on the screen with unusual crispness at all magnifications. Lenses to provide magnifications of 10X, 20X, 25X, 31¼X, 50X, 62½X, and 100X are available as standard equipment.

The high-powered lamp house is blower-cooled and provides completely uniform illumination. A color filter is also included as a part of the condenser system.

A plain platform type stage, measuring 6"x18", is included as standard equipment. Accessories are available, including a co-ordinate measuring stage, a right angle platform type stage as well as a graduated rotary screen with vernier scale.

Portman Instrument Co., Town Dock Rd., New Rochelle, N.Y.

Use postpaid card. Circle No. 116

Automatic Control Gauge

The L series C162 automatic control gauge was designed around the principle that the most precise gauge sacrifices perhaps 50% of its value unless the piece is gauged while immobile at least for a split second. An accelerator handles the piece at double the feed velocity if 100% inspection is required, so that the necessary time for a proper measurement can be taken without pile-up.

The system is most popularly applied to centerless grinding operations, and is capable of signal and feedback con-

"most used grinder" say customers

In checking with the tool, die, gage and general production shops that use SANFORD SURFACE GRINDERS, the most frequent comment was that Sanford Grinders were the "most used" of any grinders in the shop.

WET or DRY Model MG

PARTIAL SPECIFICATIONS—

Capacity — 8" x 12" x 12".
Table travel — 13", traverse 8¾".
Vertical clearance 12" under 7" wheel.
Standard grinding wheel — 7" x ½", 1¼" hole.
Spindle speed approx. 3000 RPM.
Motor, ½ HP, single or 3 ph., dynamically balanced.
Floor space — 45" x 38" x 62" high.
Net wt. with stand approx. 630 lbs.

Others have tried to copy but there's a "feel" that comes from the precise individual quality and workmanship that goes into every SANFORD GRINDER. It's the factor that can't be found in any other grinder.

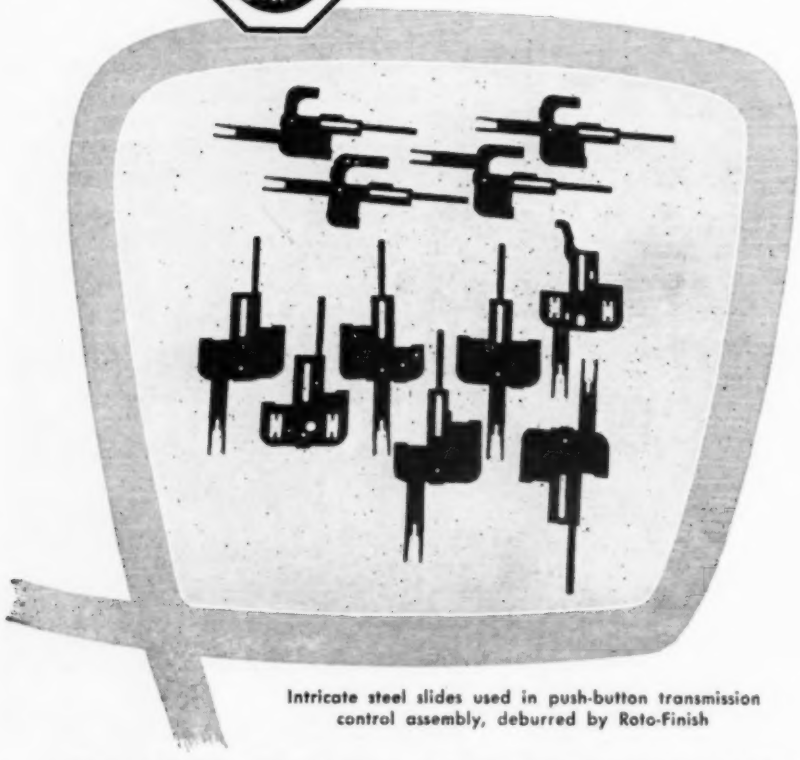
So widely used you can ask users in your own area how they like the low priced Sanford Surface Grinder.

Write for illustrated and fully descriptive literature, reconditioning facilities, optional equipment and prices.

Representatives in major industrial areas

SANFORD MANUFACTURING CORP.
1026 Commerce Ave., Union, N. J.

and the ROTO FINISH® push button driving... story behind it...



Intricate steel slides used in push-button transmission control assembly, deburred by Roto-Finish

3000 PIECES PER HOUR DEBURRED AUTOMATICALLY

That's the story of *one Roto-Finish* machine installed in a Detroit automobile plant to deburr push button transmission control slides. All the operator does is load parts into the machine. The balance of the 30 minute cycle is entirely automatic. Man power savings are tremendous!

PROCESSING MATERIAL COSTS FOR 100 PARTS—JUST 2¼¢. The cost of processing materials, both chips and compound, is .0223¢ per piece.

SEND FOR YOUR FREE ROTO-FINISH HANDBOOK

PUT ROTO-FINISH ENGINEERING SKILL AND OUR YEARS OF PROCESSING EXPERIENCE to work for you. In either your plant or our laboratory, our process engineers will prove, *before you buy*, that Roto-Finish provides the finish you want at a lower cost. Phone or write today.

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FOREIGN REPRESENTATIVES: ARGENTINA—Taller—Buenos Aires ● AUSTRALIA—A. Flavell Ltd.—Cheltenham ● BRAZIL—Commercial E. Industrial de Fornos Werco, Ltd.—Rio de Janeiro ● CANADA—Canadian Hanson & Van Winkle Co., Ltd.—Toronto ● ENGLAND—Roto-Finish Ltd.—Hemel Hempstead ● FRANCE—Societe Roto-Finish—Paris ● GERMANY, AUSTRIA, NORWAY, SWEDEN, SWITZERLAND—Metallgesellschaft A. G.—Frankfurt, a. M.—Germany ● HOLLAND, BELGIUM, LUXEMBURG—N. V. Roto Finish Maatschappij—Delft, Holland ● ITALY—Societa Roto-Finish a R. L.—Milan ● SPAIN—Instituto Electroquimico, S. A.—Barcelona

trol based on any three conditions selected such as good, over, and under. Accuracy is claimed at .000040". The EAM capacitance principles enable direct integration with the existing electrical condition.

Electro-Autosizing Machine Div., Industrial Gauges Corp., 130 The Plaza, West Englewood, N.J.

Use postpaid card. Circle No. 117

Conversion Unit for Grinders

In addition to independent dust collectors for connection to grinding available, the machines manufacturer also offers Grind-Air-rester conversion unit. Either of these units will convert existing grinders into a compact arrangement taking but a few additional inches beyond the depth (front to back) of an existing pedestal grinder, according to the announcement.

Combination pedestal-cabinet serves 7", 8", or 10" grinders. The unit pictured has capacity for two 12" or two 14" grinding wheels: the A of 16" and B of 12" is adequate to serve the average base mounting on a 2 hp or 3 hp grinder. The D width of base of 17½" identifies the required clearance between the exhaust guards on the grinder. C is 32½".

The Standard Electrical Tool Co., 2488-96 River Rd., Cincinnati 4, Ohio.

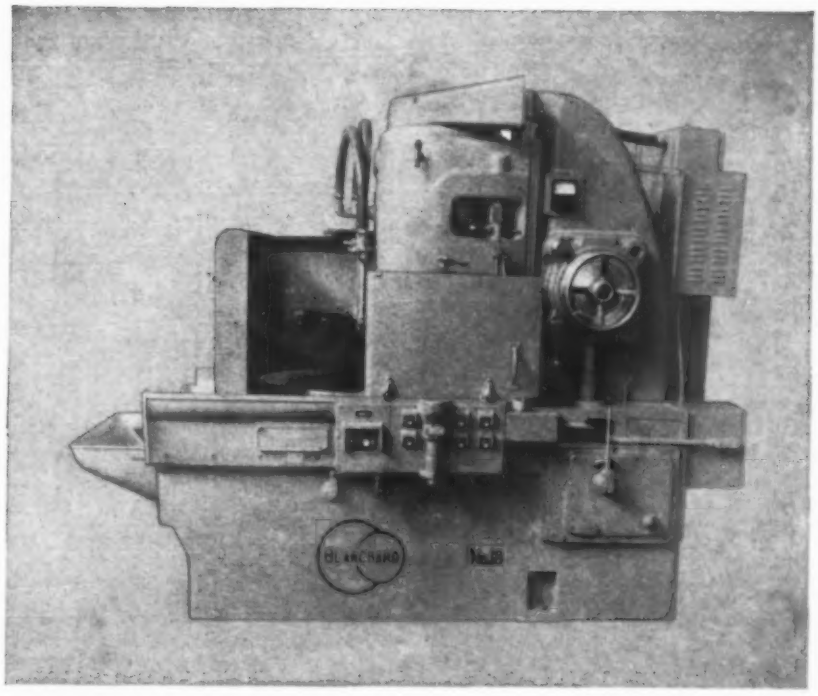
Use postpaid card. Circle No. 118

Full- and Semi-Automatic Speeders

The new line of full-automatic and semi-automatic speeders for high speed testing of cut-off saws, cup and grinding wheels make possible 100% individual speed test inspection.

Following loading, the semi-automatic operating cycle is automated as follows: pushing the two-hand starting buttons; wheel is elevated; safety

For best results from your Blanchard Surface Grinder



BLANCHARD NO. 10 SURFACE GRINDER

Use Blanchard Wheels!

Blanchard specializes in the manufacture of segments and cylinder wheels for Blanchard and other Vertical Spindle Surface Grinders. If you have a difficult grinding job, whatever the material may be, or if you are not satisfied with the results you are now getting, let us help you.

Blanchard wheels are the quality wheels for Blanchard Grinding. Use them to get maximum performance *from your Blanchard!*

PUT IT ON THE BLANCHARD

Please send me a free copy of "The Art of Blanchard Surface Grinding" (3rd Edition).

THE BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASSACHUSETTS

cover closes; wheel is clamped to turntable; wheel accelerates to pre-set speed; wheel decelerates and stops; wheel lowers to unloading position. Full-automatic models load and unload wheels automatically.

These speeders make it possible to pre-set testing speeds up to 15,000 rpm with smooth rapid acceleration and deceleration. Standard model handles wheels up to 4" thick and 20" diameter; other models for larger sized wheels.

George L. Day Co., 1227-31 Niagara St., Buffalo 13, N.Y.

Use postpaid card. Circle No. 119

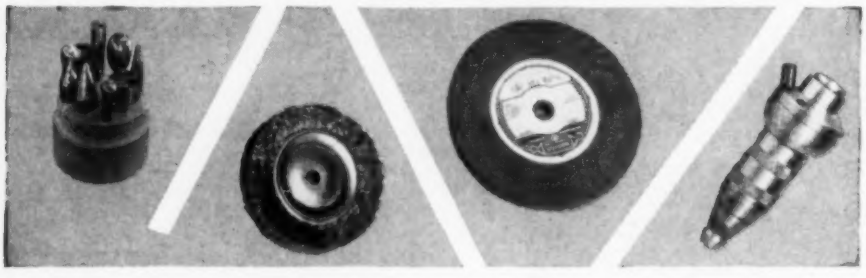
Inspection Tool Increases Accuracy

The inspection tool, Cylinder Square, in the larger size, is said to speed up and increase the accuracy of various checking operations in tool rooms, inspection and receiving departments, and in machine set-up. It is used in checking squareness, concentricity, run-out, etc., of parts, shafts, spindle, bores, and similar objects.

The tool contains powerful magnets that hold it to the surface of the part or object being checked. Clamping is not required, thus eliminating distortion and set-up time. It is made of stable steel, hardened and ground. Face of the tool is guaranteed square with the cylinder within 50-millionths of an inch. The new model is 7½" dia. x 14" long, price $131.00; smaller size 3½" x 6", $58.00.

AA Gage Company, 350 Fair St., Detroit 20, Mich.

Use postpaid card. Circle No. 120



everything you need

from start to finish

Remember, when you're checking specifications and selecting equipment, don't fail to consider Haskins flexible shaft machines and accessories. Haskins' complete line of equipment insures faultless performance on your *special* and *standard* metal-working operations —*without interruptions.*

Whether you're grinding, wire-brushing, filing, whatever the job, a start with Haskins will carry you through from the beginning right down to a perfect finish. Our three models, bench, pedestal and suspended mounts, plus a multiplicity of metal-working tools, enable you to achieve faster production, lower labor costs and a superior finished part! Find out about the versatile line of Haskins flexible shaft machines and accessories—*leaders in their field for over 30 years.*

Write Today for a Catalog and Literature

HASKINS

R. G. HASKINS Co.

2649 West Harrison Street Chicago 12, Illinois

Dust Collecting Bags

Filter power dust bags for dust collecting machines are designed in a variety of types and fabrics to handle all types of dust particles. The telescoping design of the Model BDC-12 bag provides filter area without need for excessive floor space.

The bags are used with grinders, polishers, buffers, saws, sanders, powder packaging machines, and in plants where recovery of valuable dust is essential. Worn bags can cause damage and expensive production delays if they develop leaks or blow-outs.

Modern Dust Bag Co., Inc., 132 E. Railroad Ave., West Haverstraw, N.Y.

Use postpaid card. Circle No. 121

News of Industry

The World's First Titanium Mill Devoted Exclusively to Rolling and Forging Titanium

Billets and large rounds, earmarked for civilian and military jet engine applications, are being shipped while engineering work continues on installation of sheet mills. The sheet mills are scheduled to be in operation early next year.

The Toronto, Ohio, plant will provide the Titanium Metals Corporation of America with fully integrated facilities, from sponge through forgings, billets, and alloy sheet production. Highly instrumented equipment, specifically designed or modified solely for production of titanium, is expected to reduce metal loss—currently one of the more costly items in the overall production, and ultimate price, of titanium—and to continue to improve the quality of the metal.

Ten percent of the employees at the Toronto plant have been assigned to safeguarding the quality of metal through laboratory inspection or as on-the-scene metallurgical observers. Complete laboratory facilities, equipped to perform the full run of mechanical tests required for titanium at both room and elevated temperatures, are in operation at Toronto.

A Product Development group, established to translate research ideas into practical production methods, has also been located in Toronto. Laboratory facilities for this group are currently under construction.

Safety Film

"Play Safe," is the title of a full-color sound film which helps steel mill and foundry personnel guard against avoidable grinding wheel failures and resultant physical injuries. The 16-millimeter film was produced by the Peninsular Grinding Wheel Sales Corporation and is the view of 65 years' experience with grinding wheel applications. This film may be obtained on loan by writing to Dept. A, Peninsular Grinding Wheel Sales Corporation, 729 Meldrum, Detroit, Michigan.

OVER 16,000 Hammond ABRASIVE BELT GRINDERS IN SERVICE

Hammond Machinery Builders Inc.
1651 DOUGLAS AVE. KALAMAZOO, MICHIGAN

4" ABRASIVE BELT GRINDER

MODEL 50-DD
Abrasive Belt Grinder with DusKolector

VARIABLE SPEED LATHE with Backstands and DusKolector for Fast Grinding and Finishing

MODEL VH-6WP
6" Wet-N-Dri Abrasive Belt Grinder for Finishing Flat Surfaces

"America's most complete line of grinding, polishing, and buffing equipment"
See us at The Plant Maintenance Show, Chicago Amphitheatre, Booth 1171, January 27-30.

MECHANICAL GRINDING EQUIPMENT, installed at TMCA's Toronto, Ohio plant, will speed and improve surface conditioning of billets. Initial production at the new facility is scheduled for civilian and jet engine applications. Titanium Metals Corporation of America, New York, N. Y.

Tipptronics, Inc., manufacturer of electro-mechanical devices for the control and monitoring of industrial equipment, formerly located at Tipp City, Ohio, has transferred its operations to Chagrin Falls, Ohio, in the greater Cleveland area.

Ray E. Britt, president, states "The field of automatic controls is of steadily growing importance to all phases of modern industry. Wherever a chemical or mechanical function can be measured electrically, controls can be devised to keep machinery functioning at peak efficiency, to prevent or warn of machine damage, and thus to reduce production losses due to breakdown and shut-down."

Abrasive Society News

Mr. Asher Nesin of Micro-Abrasive Corporation, Westfield, Massachusetts spoke on Abrasive Grain before sixty-two members and guests at a meeting of the Boston Chapter of American Society for Abrasives, held October 29, 1957, at the M.I.T. Graduate House, Cambridge, Mass.

The Reading, Pennsylvania, Chapter held a dinner and educational meeting October 21, at Valley Inn, Pennside. Forty-two members and guests were present. John A. Mueller of the Grinding Laboratory of the Carborundum Company presented an instructive talk illustrated by projected slides, showing the various important factors in grinding including speeds of wheels and work, wheel life, power consumption, and the cost of abrasives.

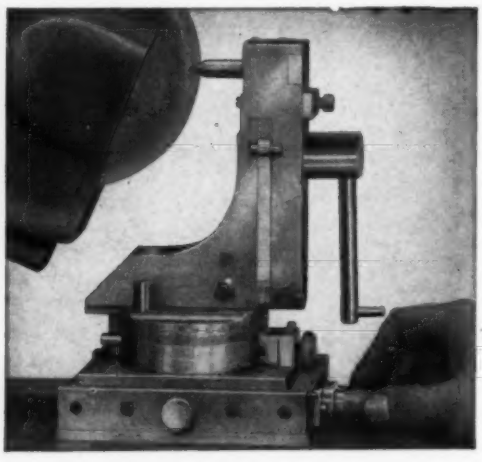
One hundred fifty members and guests were present at the Connecticut Chapter meeting held on October 28 at Wright's Steak House, Plainville, Connecticut. Mr. Fred Upper of the Carborundum Company, talked and showed colored slides on the manufacture of grinding wheels.

Tough Grinding Wheel Forms Dressed Easy as A, B, C

eliminate elaborate set-ups and operations

.0001" ACCURACY

Fluidmotion
WHEEL DRESSERS
dress two angles tangent to a radius in one continuous motion



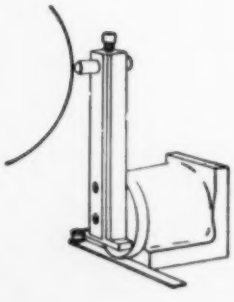
With the unique "Fluidmotion" Dresser, you can dress two angles tangent to a radius — using one handle in one continuous motion. Operation is so fast and simple that beginners can use them.

Adaptable to all type cylindrical and surface grinders.

A. Obtain micrometer reading; add required convex radius or subtract required concave radius.

B. Loosen jib with wrench and "mike" over lower pins to reading obtained above.

C. Tighten jib. Set stops for two angles. Ready for action.



Also available: "FORM MASTER" Dresser, capable of dressing any radii up to 12" convex, up to 15" concave.

See your industrial distributor or write for free literature.

J&S TOOL CO. INC. — CLAMPCUT

J & S TOOL CO., INC.
880 DORSA AVE.
LIVINGSTON, NEW JERSEY

Photograph taken at meeting October 21, 1957 Reading Chapter, American Society for Abrasives at Valley Inn, Pennside, Reading, Pennsylvania. Seated, left to right: Kenneth S. Weidner, President of Reading, A.S.A.; John Y. Arnold, National President; John A. Mueller, Carborundum Company, speaker. Standing, left to right: Paul A. Miller, Secretary of Reading Chapter; Willard J. Miller, National Treasurer; Robert W. Apted, an incorporator of the Society; Howard Burkhart, Vice-President of Reading Chapter; Joseph A. Acker, Treasurer of Reading Chapter.

American Society for Abrasives

The December meeting was held at Valley Inn on December 16. The program consisted of a film, "Cutting-Off with Abrasives," by Mr. Ben Hardy and Mr. Darvin Wadsworth, both of A. P. DeSanno & Son.

Western Michigan Chapter No. 5 of ASA

The Western Michigan Chapter No. 5 held its recent meeting at Bill Stern's Steak House in Muskegon, Mich., with members and guests totaling 47.

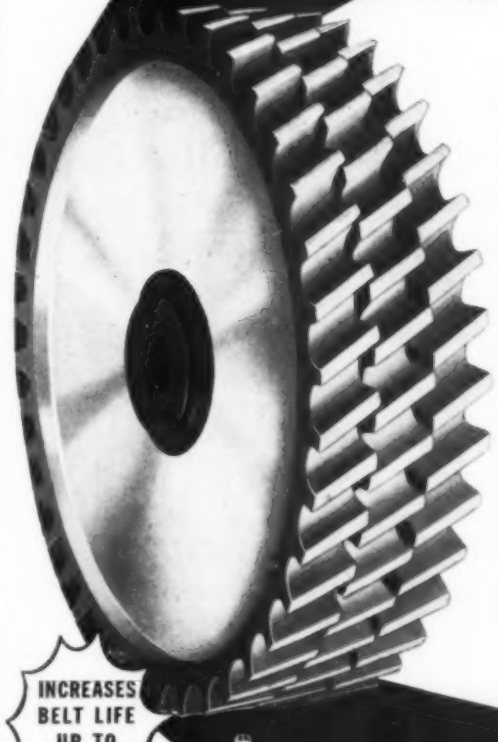
After dinner, the meeting was formally called to order by Paul Watson. Warren K. Seward of The Carborundum Co., Niagara Falls, N.Y. spoke on precision, semi-precision, and automation with coated abrasives. A question and answer period followed.

January 13 was set for the meeting at Grand Rapids, Mich. Chapter secretary, Charles Hennesen, 160 Campus Ave., Muskegon, Mich.

Cincinnati Milling V.P. Elected to ASTE Committee

Swan E. Bergstrom executive vice president of the Cincinnati Milling Machine Co., has been elected a member of the Research Fund Committee of the American Society of

new PROVEN R-58
SECTIONAL RUBBER CONTACT WHEEL
unequalled *Conformability*



INCREASES BELT LIFE UP TO 200% & BETTER

A NEW CONCEPT IN RUBBER CONTACT WHEELS ! ! !

It actually shapes itself to the work piece . . . conforms to the most difficult contours . . . covers more surface in a single pass. Here, at last, is the answer to those really tough, time-consuming grinding jobs. Consider these outstanding features:

- CONFORMS BETTER — Most versatile of all. Grinds even odd shapes because deep serrations allow it to conform like no other rubber wheel.
- SAVES TIME — Cuts faster because it hugs the contour of the piece and contacts a greater area with each pass.
- INCREASES BELT LIFE up to 200% and better — Production tests prove it. With deep grooved R-58, the belt becomes self-cleaning. It "shells out" and prevents glazing.
- ALLOWS GREATER FLEXIBILITY — Just add wheels for any width, any combination of durometers you need for the job.
- LEAVES NO PATTERN ON WORK — Carefully designed serrations give smooth, overlapping action that eliminate stripe or pattern when more than one section is used.
- LASTS LONGER — Made of new, specially compounded, High tensile long wearing rubber. If one edge wears, just reverse the wheel and it operates as effectively as ever.

Write for complete information.

It's The WHEEL That makes the difference ! ! !

CHICAGO RUBBER COMPANY, INC.
651 MARKET STREET, WAUKEGAN, ILLINOIS

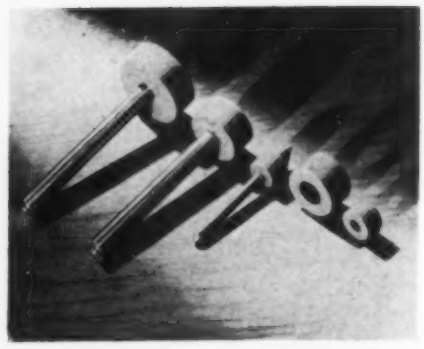
Tool Engineers, as announced by Harold E. Collins, ASTE national president.

Collins said that Bergstrom's experience would be valuable in the further development of ASTE's metal cutting research project.

Bergstrom has been with the Cincinnati Milling Machine Co. since 1927 and rose to his present position in 1956. He has served as president (1952-53) of the National Machine Tool Builder's Association, and is a member of the Society of Automotive Engineers, and the Cincinnati Engineering Society.

Company Briefs

The Abrasive division of **Elgin National Watch Company** announced the expansion of its industrial products line to include diamond mounted points and hones. Available from stock, the mounted points come in sizes ranging from 3/32 of an inch to 1 inch in diameter and hones in standard sizes, with specials available.



New diamond mounted points, ranging in size from 3/32 of an inch to 1 inch diameters, are added to the industrial tool line of the Abrasives division of Elgin National Watch Company.

Wapakoneta Machine Gets Interest in Calif. Firm

The Wapakoneta Machine Co., Wapakoneta, Ohio, manufacturer of machine knives since 1891, has purchased controlling interest in the California Grinding Works, Oakland, Calif., it was announced by M. Merle Harrod, president.

California Grinding Works, which will retain its name but be known as a subsidiary of the Wapakoneta Machine Co., is a commercial grinder specializing in machine knives, press brake dies, and types of long, flat grinding.

The machine company was organized in 1946 as the F & R Grinding Works and in 1953 was incorporated under its present name with John B. Fenstermacher as president.

The firm has established an office and warehouse in Portland, Ore., under the managership of Herman S. Morriss.

Name of the **Friden Calculating Machine Co.**, Inc., San Leandro, California has been changed to **"Friden, Inc."** Change of the company name, established in 1934, has been made because of the broad expansion in the Friden office equipment lines during recent year.

Bay State Abrasive Plan

Bay State Abrasive Products Co., Westboro, Mass., expanding its New England plant at the rate of $2 million per year, for the last two years, has plans also for further extensive plant expansion both at home and overseas.

Since November, 1955, important additions have been made to the Research

L-W MAGNETIC CHUCKS

GRIP WORK TIGHTLY for Wet or Dry Grinding

Guaranteed Waterproof Connections for either 110 or 220 v. D.C.

Working Surface

5¾" x 13" .....$ 80.00
6½" x 18" $100.00
8" x 24" $213.50
10¾" x 37" $375.00

RECTIFIERS

A. C. input 110 volts. D. C. output 110 volts. P-1 for 5¾" x 13" chuck 0.8 amps. $57.50
P-2 for 6½" x 18" chuck 1.0 amps. $88.75
P-3 for 8" x 24" 10¾" x 37" chuck 3.0 amps. $87.50

DEMAGNETIZING SWITCHES

For 5¾" x 13" and 6½" x 18" sizes. $15.00
Field discharge type for 8" x 24" and 10¾" x 37". $27.00

ROUND TYPE
3¾" opening
$27.50

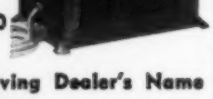
DEMAGNETIZERS

Instantly demagnetize tools or production parts. No moving parts. 110 v., 60 cy. A.C.

PLATE TYPE

MODEL B-2
7¾" x 12½" x 6¾" $78.00
Ship. wt. 55 lbs.

MODEL J-1
7¼" x 7¼" x 6¾" $54.00
Ship. wt. 35 lbs.



See Your Dealer or Order Direct, Giving Dealer's Name

Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products

L-W CHUCK COMPANY 1644 SO. ST. CLAIR ST. TOLEDO 4, OHIO

CYCLONE SEPARATION

FOR MORE EFFICIENT DUST COLLECTION —FILTERS LAST LONGER

Almost all industrial dusts can be collected more efficiently by Dustkop. Thirty-seven standard models *ready to use!* Reduce installation costs — save space. Write for descriptive literature.

DUSTKOP® STOPS DUST

ALSO A COMPLETE LINE OF MIST COLLECTORS

AGET MANUFACTURING COMPANY
1380 EAST CHURCH ST., ADRIAN, MICH.

FREE BOOKLET

... tells how to judge diamond quality.

SEND FOR YOUR COPY TODAY!

Most up-to-date information available. Helps you use diamond better, more efficiently. Serves as guide when buying or using diamond.

Elgin Diamond is the standard for industrial diamond quality. Only Elgin offers this Master Comparison Gage to let you check your own diamond for grading and purity.

ABRASIVES DIVISION, DEPT. G

ELGIN NATIONAL WATCH COMPANY

ELGIN, ILLINOIS

ACCURACY .0002 T.I.R.

.0002 T.I.R. or less at Spindle Nose, .0005 T.I.R. or less on Test Arbor six inches from Spindle Nose

SPINDLE SPEEDS 150 and 250 RPM Other Spindle Speed Pulleys Available

MODEL B943 MOTOR DRIVEN WORK HEAD

No. 11 B & S Tapered Spindle Standard Equipment. No. 12 B & S or No. 5 Morse Available at Slight Extra Cost.

Clip ad to your letterhead and send for Literature

K. O. Lee Company, Aberdeen, S. D.

LEA GRIPMASTER®

Industry's Abrasive
BONDING CEMENT
for Wheels and Belts

PRODUCTION TESTS SHOW 25% TO 35% INCREASE IN WHEEL OR BELT LIFE

LEA GRIPMASTER offers other values, too. For example, it sizes as well as bonds. Its single grade bonds effectively a wide range of grit sizes. It's more flexible.

We're not asking you to commit yourself blindly with a large order. In fact, we're offering you a generous free sample so that you can give a wheel or belt a good competitive work out. Just fill in and mail us the coupon below. The sample of GRIPMASTER will be in your hands in a few days.

LEA-MICHIGAN, INC.
14066 Stansbury Ave., Detroit 27, Michigan
(A member of the well known Lea Group of Finishing Specialists)

Lea-Michigan, Inc.
14066 Stansbury Ave.
Detroit 27, Mich.

☐ Please send us your free sample of GRIPMASTER.
☐ Please send us literature giving full details.

Name_____ Title_____

Company_____

Address_____

and Quality Control Laboratories, while increased demand for Bay State wheels has led to a 73,600 sq. ft. expansion of space allotted to vitrified, resinoid, and rubber bonding operations. A new abrasive processing plant is almost completed, and a high proportion of the new equipment being installed is either semi-automated or fully automated.

At the company's annual employee service award event, Mr. Earl C. Hughes, executive vice president, revealed that plans for the following projects are in the formative stage: (1) A new and larger district office and warehouse in Cleveland, Ohio; (2) An abrasive grain crushing and processing plant in Westboro; (3) A grinding wheel manufacturing plant in California; (4) A coated abrasive manufacturing plant in Westboro, (5) and negotiations to build a complete grinding wheel manufacturing plant in Italy.

The Abrasives division of **Elgin National Watch Company** have added six new distributors to handle the division's line of solid carbide rotary tools. William H. Baudouine, sales manager, announced the new distributors as: N. T. Bushnell Co., New Haven, Conn.; Durant Tool Supply Co., Providence, R.I.; Tools and Abrasives, Inc., Ft. Wayne, Ind.; S.G.S. Tool Company, Akron, Ohio; Janco Industrial, Rockford, Ill.; B.S.A. Tools Limited, Toronto, Ontario.

De Laval Opens District Office

De Laval Separator Co., Poughkeepsie, N.Y., announced the opening of a new district office at 121 Coulter Ave., Ardmore, Pa. Mr. George G. Teren, Jr., will take over as manager. The new office will have facilities for servicing the centrifugal and plate heat exchanger needs in the Pennsylvania area.

George G. Teren, Jr., has been named district office manager of the newly-opened De Laval (Poughkeepsie, N.Y.) district office at 121 Coulter Ave., Ardmore, Pa. Mr. Teren joined the company in 1950 as a sales trainee, his most recent position being that of sales engineer for the Pittsburgh office.

Bates Products, Inc., specialists in producing resin-bonded abrasive sanding discs, is offering a consulting service that makes available its special corp of abrasive engineers.

Any manufacturer can arrange to have an abrasive engineer visit his plant, or obtain samples of "Marvel" resin-bonded abrasive sanding disc by writing to Bates Products, Inc., 1129 E. 74th St., Chicago 19, Illinois.

Personnel Briefs

Robert K. Guy has been named assistant to the executive vice president, Air Moving and Conditioning Association, Detroit, Michigan. Guy was a sales engineer with the Perfection Industries Division of Hupp Corporation.

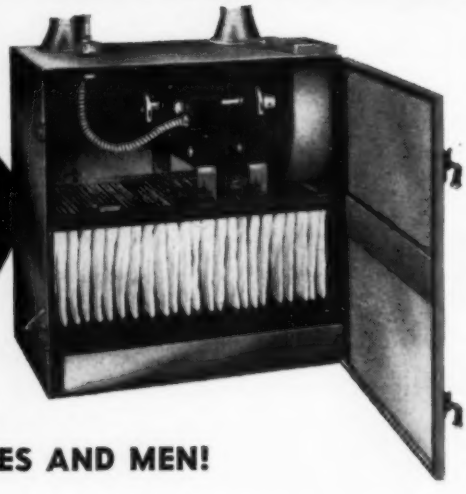
Kirke W. Connor has been elected chairman of the board of Micromatic Hone Corporation, Detroit, Mich., and **Don S. Connor** president and general manager.

Kirke Connor founded the company in 1929. Don Connor joined in 1933.

STOP SHOP DUST IN ITS TRACKS!

WITH THE EQUIPMENT THAT *FIGHTS* IMPURE AIR IN INDUSTRY.

THE CINCINNATI AIR MASTER



THE ANSWER TO DUST, GRIT, GRIME THAT DOOMS MACHINES AND MEN!

GRINDING
BUFFING
POLISHING
DE-BURRING

Metal and wheel grit from grinding, buffing, polishing and deburring is trapped by Airmaster instantly, filtered out by fabric and steel wool bags. Only clean air, grit-free and safe for both men and machines, is discharged. Rugged construction and simplicity of design has made the Cincinnati AIRMASTER famous.

Featured nation-wide by leading distributors. Write for catalogue TODAY!

Makers of a complete line of pedestal and bench grinders and buffers, speed lathes, dust collectors and cut-off machines.

THE CINCINNATI ELECTRICAL TOOL CO.
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MACHINE TOOLS "Cyclopedia"

. . . a 500 page volume listing 345 American machine tool builders—with location, phone number, personnel, products, trade names and representation throughout the U.S.A. and Canada! For complete indexes bound together with catalogs of many leading builders and delivered to you—the machine tool buyer—FREE.

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FREE TRIAL OFFER
NO STRINGS ATTACHED

A VALUABLE KIT
Carton contains 6 grades of ultra-fine quality, assorted fine grit abrasive compounds suitable for a variety of work. Coarser grit compound can also be supplied.

FOR PRECISION LAPPING

Here's a get-acquainted offer you cannot afford to miss. Among these samples will be found the answer to many a tool room lapping problem. Hard and soft abrasives for all kinds of lapping needs. Sent post paid anywhere in the U.S.A. and Canada.

No obligation—write today on your company letterhead.

OFFER LIMITED to those writing on company letterhead

PROVE THEM AT OUR EXPENSE!

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518 HELWOOD ST. USP PITTSBURGH, PA.

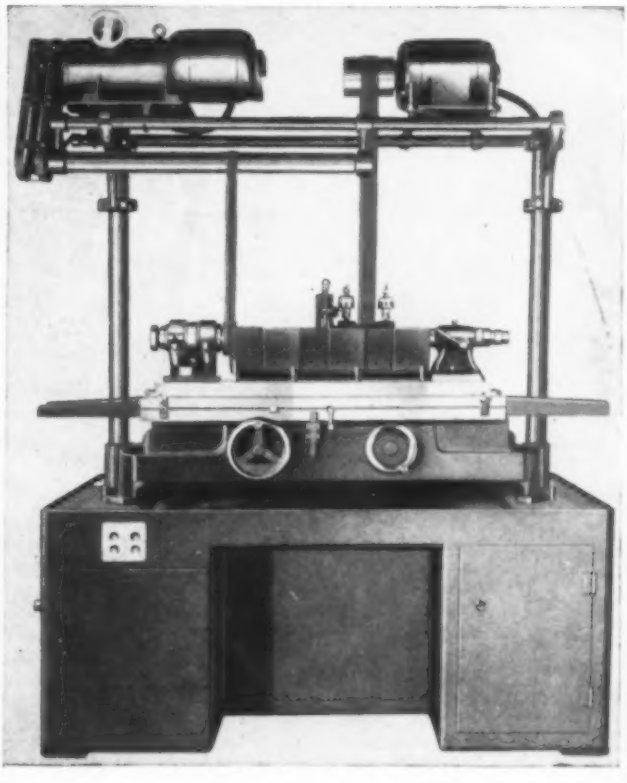
A GUARANTEE FOR YOUR CRYSTAL LAKE GRINDER

When purchasing a REX SUPERVAN HIGH SPEED STEEL SPINDLE for your Crystal Lake Grinder an additional $50.00 to the purchase price will give you a TWO YEAR SPINDLE GUARANTEE.

EASY OPERATION: CLOSE TOLERANCES:
ACCURACY: FINE MICROINCH SURFACE FINISH

A CRYSTAL LAKE GRINDER will hold size as well as grind round from .000005 to .000020" and finish from One to Four Microinch SURFACE FINISH. The essentials in grinding are a round spindle, taper bearings, a spindle that can be adjusted periodically without the squashing of bronze boxes and to have belt pressure ninety degrees from grinding pressure so the bronze boxes will not wear out of round.

For example, fuel injectors, after having been rough ground, can be ground to .000010" roundness with a sixty grit wheel and one pass of the wheel.



Write for literature

CRYSTAL LAKE GRINDERS

Since 1910

CRYSTAL LAKE, ILLINOIS

He was elected to the board of directors in 1944, and in 1955 was named executive vice president and general manager.

Kirke W. Connor
Micromatic Hone Corp.

Don S. Connor
Micromatic Hone Corp.

William H. Harris, Jr., has been appointed executive vice president, and **William J. Pinkerton** administrative vice president of Micromatic Hone Corp.

Mr. Harris has been chief engineer at the company since 1941 and succeeds Mr. Don S. Connor newly-elected president and general manager. Harris was made vice president in charge of engineering in 1952 and elected to the board of directors in 1953.

William H. Harris Jr.
Micromatic Hone Corp.

William J. Pinkerton
Micromatic Hone Corp.

Mr. Pinkerton came to the firm in 1942 as personnel director. In 1952, he was elected vice president in charge of manufacturing.

Dr. Erwin G. Loewen has been appointed technical director, and **Franklin Meyer, Jr.,** assistant manager of the Small Tool and Gage Div., effective January 1, according to announcement from The Taft-Peirce Mfg. Co., Woonsocket, R.I.

Dr. Loewen has been staff engineer and director of Machine Tool Production. In his new office he will be responsible for over-all plant quality control policy. Franklin Meyer assumes his new post in addition to his position as manager of the Instrument Gage Div. His new duties concern production organization.

Franklin Meyer, Jr.

Erwin G. Loewen

Our customers have called us the "King of Diamonds"

They feel we have earned this title in supplying American Industry with quality industrial diamond tools and wheels for over 117 years. In these 4 generations, the name DESSAU has become synonymous with the word progress—forging ahead with the most modern type of manufacturing plants, methods, and equipment in the industrial diamond industry. It is the goal of our company to remain worthy of the title which has been bestowed upon us.

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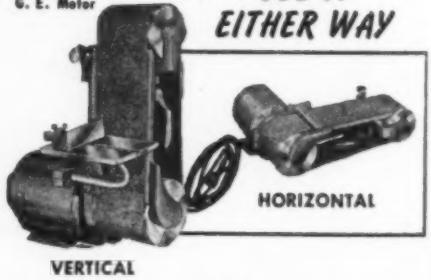

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Let us send you two samples of these true-running uniform Chicago Mounted Wheels. Try them at no cost to you. Send coupon below.

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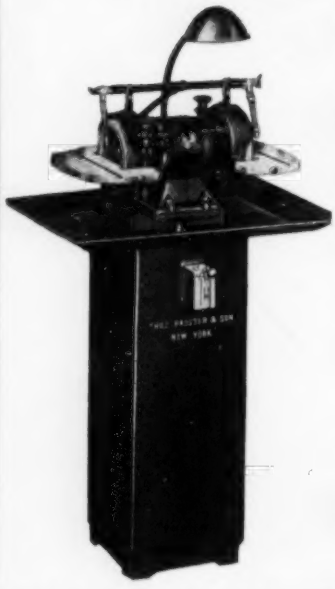
ECONOMICAL CARBIDE GRINDING



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Better cutting edges at lower cost—save diamond wheels

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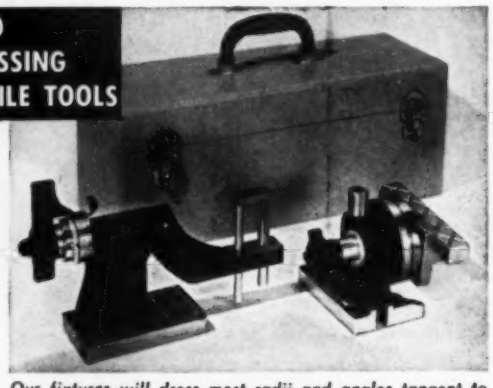
RIVEREDGE & SUMMIT TENAFLY, N.J.

Now ANGLE TANGENT TO RADIUS WHEEL DRESSING WITH NEW VERSATILE TOOLS



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(Both tools including diamonds)

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Our fixtures will dress most radii and angles tangent to each other, similar to those shown below.

FREE handsome, wooden storage box. Write for complete information.

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Now you can purchase either the G-5 Radius Dresser or the G-2 Angle Dresser and Tool Holder separately if you so desire. (Without storage boxes)

G-5 Radius Dresser complete with diamond $80.00.

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Replacement diamonds are always available for our units at a reduced price. Diamonds for the G-2 $5.00 each; diamonds for the G-5 $8.00 each.

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The *Best* Diamond wheel ever developed

- U.S. DIAMOND'S PROVEN REVOLUTIONARY "PRESSURELOK"® Process increases Diamond holding efficiency by 300%.
- Positively no danger of heating or cracking carbide with the most rapid stock removal.
- Use dry or with coolants.
- They are consistently super-finishing, out-producing, under-costing any other Diamond wheel ever produced . . . and they are always readily available.
- If you have used them, you know they are the best! . . . If you haven't, let us show you!

U S

UNITED STATES DIAMOND WHEEL CO.
835 ILLINOIS AVENUE
AURORA ILLINOIS

General Clinton F. Robinson, President of the **Carborundum Company,** announced that the company's Stupakoff Division at Latrobe, Pa., Globar Division at Niagara Falls, N.Y., and Refractories Division at Perth Amboy, N.J. will be integrated into one division, named the Refractories Division effective January 1, 1958. All personnel, plants and activities, except the Stupalox sintered oxide cutting tool project formerly at the Stupakoff Division will be combined in the newly established Refractories Division.

Boyd M. Johnson, Vice President of the company, was named General Manager of the new division. **Robert A. Barr** was appointed Assistant General Manager in charge of sales and **A. L. Leo-Wolf** was made Assistant General Manager in charge of operations. Johnson, Barr and Leo-Wolf were formerly general managers of the Refractories, Stupakoff and Globar Divisions respectively which are now merged into the new, more diversified Refractories Division.

The Stupalox project has been assigned to the New Products Branch of the Research and Development Division. E. Kibbitt, project manager, will report to Mr. D. G. Sturges, manager of the New Products Branch.

Carl F. Leitten has been elected president and chief executive officer of Electro Refractories & Abrasives Corp. of Buffalo. He succeeds **Grant S. Diamond,** who has held the post for the past 14 years, and who now becomes chairman of the board.

The changes will permit Mr. Diamond to spend much time in the development of Spar-Mica Corp. Ltd. of Montreal, of which he is president, and in which Electro Refractories has an interest.

Leitten also was elected president of Electro Refractories of Cap de la Madeleine, Quebec, a subsidiary of the Buffalo corporation. He has been executive vice president of the parent company since February, 1955. He is also a vice president and director of Spar-Mica.

Spar-Mica recently put a new processing plant into operation at Cape Feldspar on the Gulf of St. Lawrence.

Hugh A. Allen will be Traffic Manager of the Norton Company following the retirement of Frederick D. Wilson. **Frederick A. Anderson** assumes a newly created post as Traffic Rate Specialist on December 1. Both men will report to J. Douglas Dawson, general traffic manager.

Two other appointments by the Norton Company were **William H. Silvester, Jr.** to supervisor of traffic for the Grinding Machine Division and **Frederick W. Lester** to supervisor of the bill of lading section for all domestic traffic except grinding machines.

Peter W. Platten and **Jack F. Breen** have been appointed sales supervisors, Coated Abrasives Div., Armour and Co., Alliance, Ohio. Platten will supervise industrial and retail sales in Eastern and Southern Michigan; Breen in the west Cleveland area.

Prior to their recent appointments, the two men were salesmen—Breen with the Osborn Mfg. Co., and Platten with the U.S. Bora and Chemical Co.

Walter W. Goehring has been promoted to manager of the manufacturing department of the F. J. Stokes Corporation, Philadelphia, according to an announcement by F. J. Stokes, Jr., vice president, operations. Mr. Goehring was formerly manager of manufacturing for the Can Division of Crown Cork & Seal Company, Inc. and before that was general factory manager of SKF Industries, Inc.

Walter W. Goehring
Mgr. Mfg. Dept.
F. J. Stokes Corp.

suspension type
FLEXIBLE SHAFT MACHINE
eliminates tooling problem for I.B.M.

International Business Machines Corporation had the problem of reaming holes .813″ in diameter in the mounting hanger on the main base of their 407 Accounting Machine. To eliminate expensive tooling for this operation, they selected a STOW V50 portable flexible shaft machine, which was specially fitted with an on-off switch mounted on the handpiece.

The V50 machine delivers 1150, 2100, 3450, or 5750 RPM, is furnished with a 6 foot flexible shaft. Other speeds can be achieved by using different size pulleys. (I.B.M. ran the reamer at 750 RPM.) Available in either ¾, 1, 1½ or 3 HP, the V50 can be used for grinding, buffing, sanding, wire brushing and drilling.

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310 Shear Street **Binghamton, New York**

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Model M-CR-B

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Outstanding, powerful, fast-cutting tools of proven high efficiency. Designed for tough jobs and real production. Perform indefinitely and dependably. Precision made. Steel housing for safety. Also other models.

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★These diamonds can be set in any shank to your specification for $1.00 each extra.
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Manufacturers of a complete line of diamond tools and wheels
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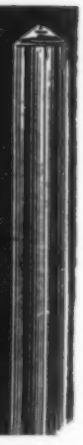

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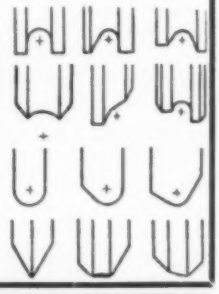

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The Vitrified Wheel Company, Henning A. Johnson, President has announced the appointment of **E. F. Mitchell** as Vice President and General Manager.

E. F. Mitchell
Vitrified Wheel Co.

J. E. Workman
Latrobe Steel Co.

J. E. Workman has been appointed Executive Vice President of Latrobe Steel Company, according to an announcement from M. W. Saxman, President. Workman, a native of Mansfield, Ohio, moves into a newly-created position. He joined the company in 1935 in a sales capacity. In 1947 he was named vice president-sales and is a member of the company's board of directors. Also announced was the appointment of **Howard M. Givens** as Vice President-Sales and **W. G. Dahl** as General Sales Manager. Givens currently is serving as Latrobe's Southern regional manager and Mr. Dahl as Eastern regional manager.

Howard M. Givens
Latrobe Steel Co.

W. G. Dahl
Latrobe Steel Co.

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11" x 20" Electro Mechanical Grinder $3600.00
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Close tolerance production units capable of .0001" tolerances in production. Long conical adjustable plain bearings on both grinding wheel and feed wheel spindles with pressure oil bath lubrication. Equipped for bar feed, thru feed, and infeed work with automatic ejectors and automatic cycling on infeed where desired. Diamond or crush dressing on both wheels with contour form and taper dressing of wheels by either hand feed screw or hydraulically.

Model 0—Work Dia. .020"-½". 10 x 2¼" x 5" Wheel with 3 H.P. $2250.00
Model 1—Work Dia. .020"-2". 12 x 4 x 8" Wheel with 5 or 7½ H.P. $3450.00
Model 3—Work Dia. .030"-3". 14 x 7 x 5" Wheel with 16 H.P. $5750.00

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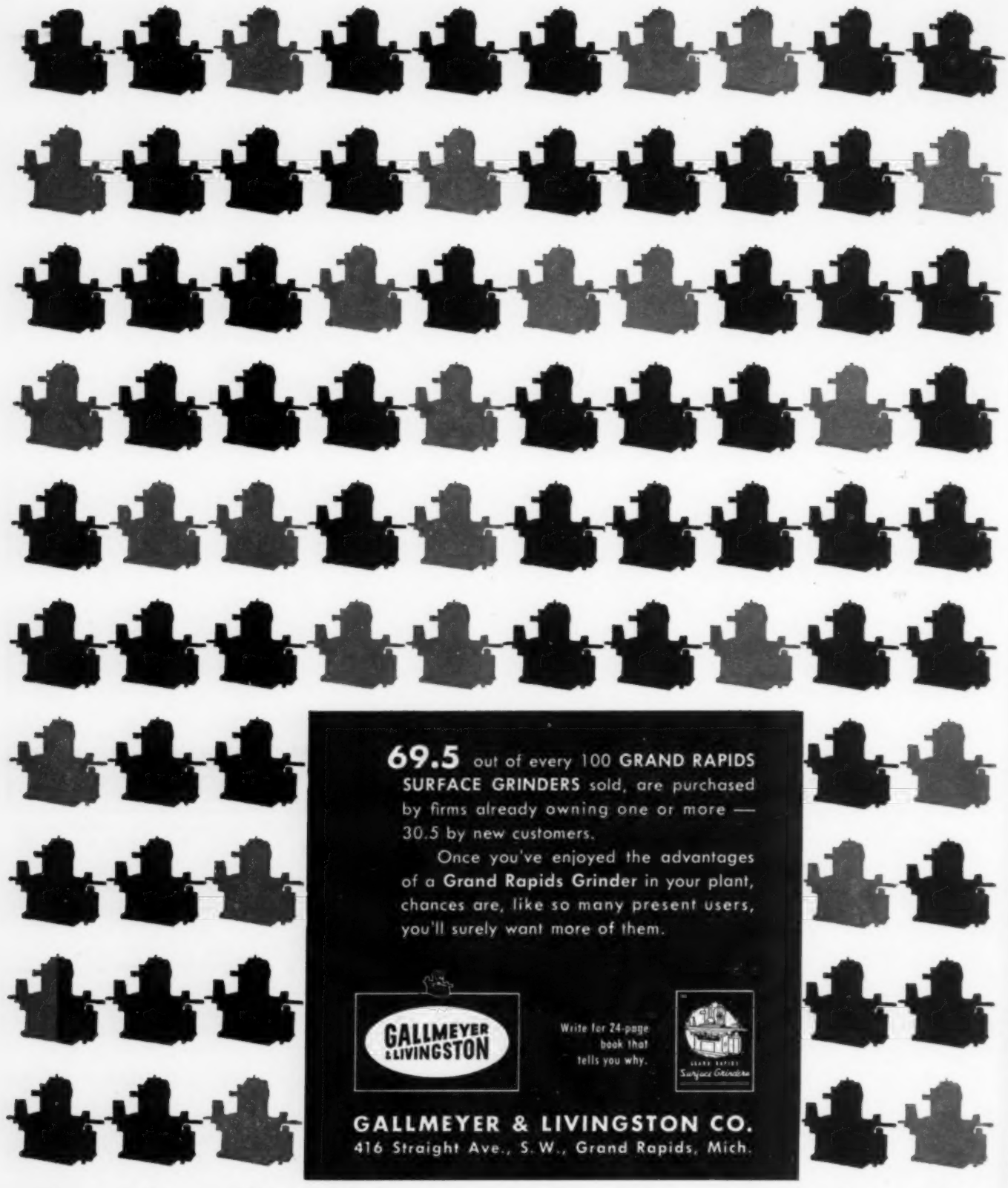

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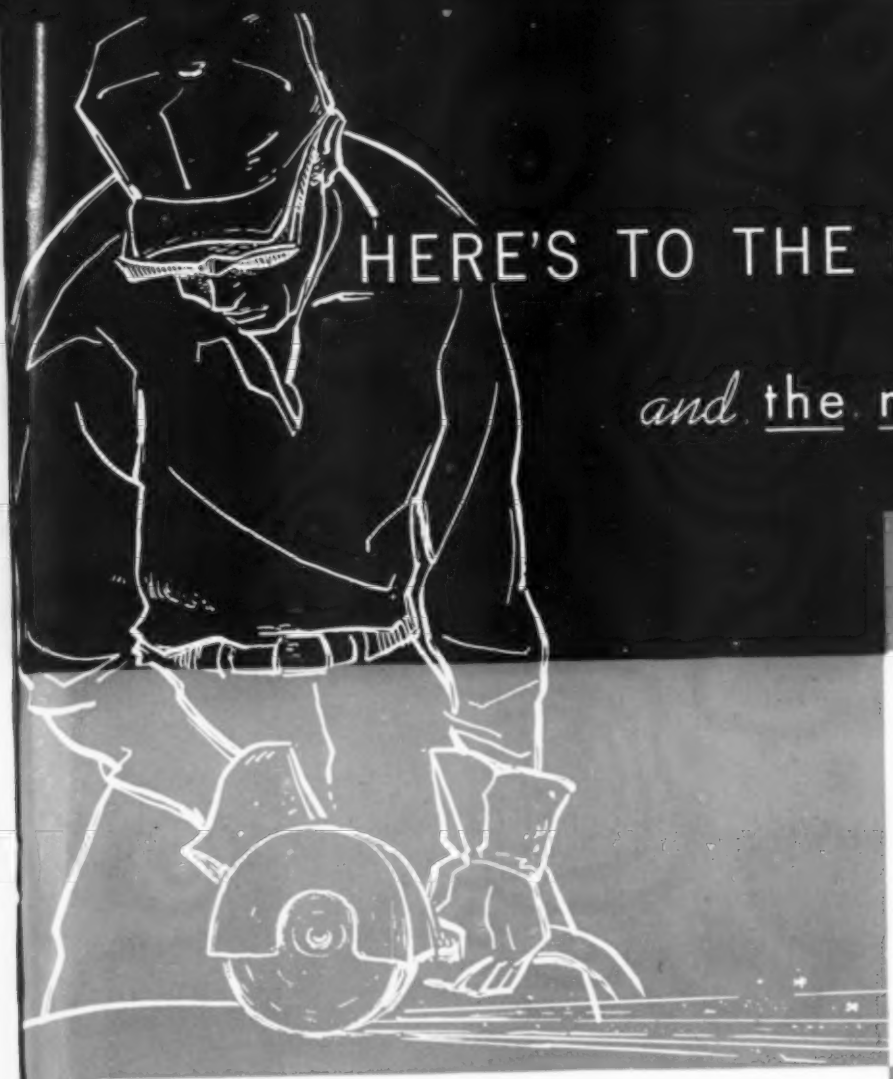

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and the metal, too!

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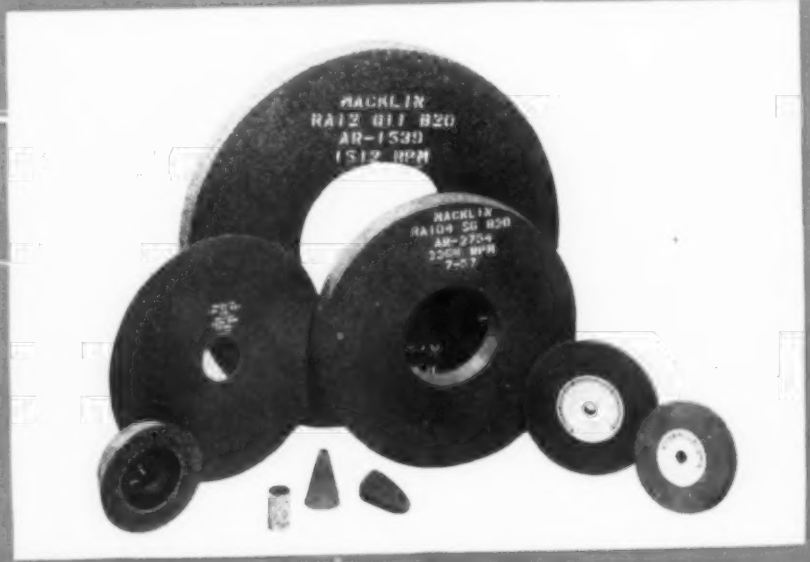
RESINOID SNAGGING WHEELS



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Tracking of the oscillating belt is controlled by photocells which prevent override and damage to belt or sheet. Positive stops control stock removal to correct mill tolerances. On 48 in. by 12 ft sheets, for example, gauge thickness can be held within plus or minus .0015 in. And, Mattison's exclusive diamond head design improves belt performance and reduces belt cost. Longer belts improve flexing and chip removal, stay cool and free-cutting longer.

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Rugged new pinch roll grinder eliminates chatter and revolution marks, is capable of producing #3 finish with a 100 grit belt *in a single pass.* High-production method for grinding sheet or strip to correct gauge thickness as well as preliminary grinding of breakdowns between passes in rolling mills. Used by custom-finishers to obtain correct surface characteristics on almost any material. An important production advantage is the machine's ability to work in either direction. Feed rolls and work rolls have been designed so material can be fed *with* the rotation of the belt or *against* it, with equal efficiency.

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